EPA/AMD/R05-00/161
2000

EPA Superfund
Record of Decision Amendment:

FEED MATERIALS PRODUCTION CENTER (USDOE)
EPA ID: OH6890008976
OU 04
FERNALD, OH
07/13/2000

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 2001

Mr. Marty Graves
US EPA Superfund Document Center 5202 G
1200 Pennsylvania Avenue N.W.
Washington DC 20460

Re: FY 2000 ROD Document

Dear Mr. Graves:

US EPA Region 5 is sending the hard copy of the ROD for Feed Materials Production Center, US DOE, OH6890008976, signed on 7/13/00. Mr. Hans Waetjen from HQ informed Region 5 on March 28, 2001, that HQ never received the hard copy of the ROD, and that HQ would like to receive the hard copy of the Decision Documents for US DOE, Feed Materials Production Center site located at Fernald, Ohio.

Enclosed is the Decision Document for Feed Materials Production Center, US DOE, OH6890008976.

If you have any questions, please contact Sangsook Choi at (312) 353-1869.

Sincerely yours,

Debra Potter

Debra Potter
Chief, Program Management and Information Section

Enclosure

cc: Hans Waetjen, HQ

Department of Energy

Ohio Field Office
Fernald Area Office
P. O. Box 538705
Cincinnati, Ohio 45253-8705
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JUL 31 2000

DOE-0900-00

ROD Clearinghouse
Superfund Document Center
U.S. EPA Mail Code 5202G
401 M Street, SW
Washington, DC 20460

To Whom It May Concern:

FINAL RECORD OF DECISION AMENDMENT FOR OPERABLE UNIT 4 SILOS 1 AND 2 REMEDIAL ACTIONS

Pursuant to the U.S. Environmental Protection Agency (U.S. EPA) guidance, presented in Appendix D of "A Guide to Preparing Superfund Proposed Plans, Record of Decisions (ROD), and Other Remedy Selection Decision Documents," (EPA 540-R-98-031, July 1999), please find enclosed an unbound hard copy of both the Revised Proposed Plan and the ROD Amendment for OU4 Silos 1 & 2 Remedial Actions. A copy of the electronic files of the main text and appendices of the Revised Proposed Plan and the Record of Decision Amendment have also been included with placeholders for figures.

If you have any questions regarding this documentation, please contact Nina Akgündüz at (513) 648-3110.

Sincerely,

Johnny Reising

Johnny W. Reising
Associate Director
Environmental Management

FEMP:Akgündüz

Enclosures

FINAL

RECORD OF DECISION AMENDMENT
FOR OPERABLE UNIT 4 SILOS 1 AND 2 REMEDIAL ACTIONS

AT THE
UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

40700-RP-0008

June 2000
Revision 0

Prepared Under DOE Contract No. DE-AC24-92OR21972
By Fluor Fernald, Inc.

FERNALD
Environmental Management Project

RECORD OF DECISION AMENDMENT
FOR OPERABLE UNIT 4 SILOS 1 AND 2 REMEDIAL ACTIONS

AT THE

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JUNE 2000
REVISION 0

W.E. Murphie — 6/23/00

William E. Murphie — Date
Director Ohio Office, Office of Site Closure,
United States Department of Energy

Wm. E. Muno — 7/13/00

William E. Muno, Director — Date
Superfund Division
United States Environmental Protection Agency – Region V

DECLARATION STATEMENT

SITE NAME AND LOCATION

Fernald Environmental Management Project (FEMP) Site -- Operable Unit 4 (OU4), Silos 1 and 2 material, Fernald, Hamilton County, Ohio.

STATEMENT OF BASIS AND PURPOSE

This Record of Decision Amendment for Remedial Actions at Silos 1 and 2 [hereinafter called “the ROD Amendment”] addresses the re-evaluation of the treatment component of the selected remedy for the remediation of the OU4 Silos 1 and 2 material at the FEMP Site in Fernald, Ohio. The remedial action (RA) identified in this ROD Amendment was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) [40 Code of Federal Regulations (CFR) Part 300].

The selected remedy outlined in the OU4 ROD (EPA 1994) consisted of the removal of the contents of Silos 1, 2, and 3; remediation by vitrification and off-site disposal of the treated material at the Nevada Test Site (NTS); and the demolition, removal and final disposition of the contaminated concrete, debris, and soils within the OU4 boundary, in accordance with the OU3 and OU5 RODs. In July 1997, the EPA directed DOE-FEMP to develop a supplemental Feasibility Study/Proposed Plan (FS/PP) and subsequent ROD Amendment to reevaluate the treatment remedy for the Silos 1 and 2 material. In accordance with the same agreement, an Explanation of Significant Differences (ESD) was prepared (FEMP 1998a) documenting the change in remedy for Silo 3 material. The scope of this ROD Amendment is limited to revising the treatment portion of the selected remedy for the Silos 1 and 2 material.

The decision presented herein is based on the information available in the administrative record for OU4, which is maintained in accordance with CERCLA. The major documents prepared through the CERLCA process include the Remedial Investigation (RI), the Feasibility Study (FS), the Proposed Plan (PP), and the ROD for OU4, and the revised FS and PP for the Silos 1 and 2 material. This decision also considered state and stakeholder input, including input received during the public hearing held in Fernald, Ohio and the public meeting held in Las Vegas, Nevada following the issuance of the revised FS and revised PP for Silos 1 and 2 material. DOE has considered all comments received during the public comment period on the revised FS and revised PP for Silos 1 and 2 material in the preparation of this ROD Amendment.

The State of Ohio concurs with the remedy and the applicable or relevant and appropriate requirements (ARARs) put forth in this ROD Amendment for the remediation of OU4 Silos 1 and 2 material.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from OU4, if not addressed by implementing the response action selected in this ROD Amendment, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

On the basis of the evaluation conducted on the final alternatives as part of the revised FS/PP, the selected remedy identified in the OU4 ROD addressing Silos 1 and 2 material at the FEMP has been modified to the following:

- Complete removal of contents of Silos 1 and 2 and the Decant Sump Tank System sludge from the Transfer Tank Area (TTA) followed by treatment using chemical stabilization to stabilize characteristic metals to meet Resource Conservation and Recovery Act (RCRA), as amended, toxicity characteristic limits and attain the Nevada Test Site (NTS) waste acceptance criteria (WAC).

- Gross decontamination, demolition, size reduction, and packaging of concrete from Silos 1 and 2 structures followed by shipment for off-site disposal at the NTS or an appropriately permitted commercial disposal facility (PCDF).

- Disposal of contaminated soil and debris, excluding concrete from Silos 1 and 2 structures, in accordance with the FEMP On-site Disposal Facility (OSDF) WAC or an appropriate off-site disposal facility, such as the NTS or a PCDF.

In addition, the selected remedy includes the following components, which were not reevaluated, and remain as documented in the OU4 ROD:

- Off-site shipment and disposal of the chemically stabilized waste at the NTS.

- Decontamination and dismantlement (D&D) of all structures and remediation facilities in accordance with the OU3 ROD.

- Removal of the earthen berms and excavation of the contaminated soils within the OU4 boundary, to achieve the remediation levels outlined in the OU5 ROD.

- Appropriate treatment and disposal of all secondary wastes at either the NTS or an appropriate PCDF.

- Collection of perched water encountered during remedial activities for treatment at OU5 water treatment facilities.

- Continued access controls and maintenance and monitoring of the stored waste inventories.

- Institutional controls of the OU4 area such as deed and land-use restrictions.

The FEMP OSDF will be available for disposal of debris from Silos 3 and 4 and associated facilities (the silo superstructures and the Radon Treatment System). Soil and debris from D&D activities associated with these facilities will be disposed in the OSDF if they meet the WAC for disposal. Any soils and debris that do not satisfy the OSDF WAC will be disposed at the NTS or a PCDF.

The concrete from Silos 1 and 2 is more appropriately managed in the same manner as "Category C, Processed-related Metals." This is due to its prolonged contact with the Silos 1 and 2 material, the likelihood of contaminant migration to the interior of the concrete, and the uncertainty in the ability to adequately decontaminate it. Therefore, concrete from Silos 1 and 2 is excluded from disposal at the FEMP OSDF. The interior surface of Silos 1 and 2 will be gross decontaminated to remove visible Silos 1 and 2 material before the structures are demolished, size reduced, and packaged for off-site disposal.

Based on the current operating schedule, however, the FEMP OSDF will not be available for disposal of soil and debris generated from D&D of the OU4 remediation facilities, which include the Decant Sump Tank System, other below-grade appurtenances, and OU4 Area 7 soils. Therefore, the revised FS and PP assumed for costing purposes that all soil and debris from D&D of the OU4 remediation facilities, including treatment facilities, TTA, Radon Control System (RCS), and Pilot Plant, will be disposed at the NTS. However, should programmatic changes occur and the OSDF become available, soil and debris meeting the OSDF WAC will be disposed in the OSDF.

In reaching the decision to implement this remedial alternative, chemical stabilization and vitrification were identified for detailed analysis in the revised FS based upon screening of a wide range of potential treatment alternatives.

A description of the alternatives selected for detailed analysis is provided in Section 3 of the revised FS, which is available in the Administrative Record. The alternatives were evaluated using the nine criteria specified by the NCP in 40 CFR Part 300. A comparison of the alternatives against the nine criteria is presented in **Section 5** of this ROD Amendment. The selected remedy satisfies both of the threshold criteria specified by the NCP and represents the best balance between the alternatives with respect to the five primary balancing criteria.

This remedy will achieve substantial risk reduction by removing the sources of contamination, treating the material that poses the highest risk, shipping the treated material off-site for disposal, and managing the remaining contaminated soils and debris consistent with the site-wide strategy for the FEMP. The selected alternative provides treatment to substantially reduce the mobility of the constituents of concern present in the Silos 1 and 2 material. The selected remedy also provides a high degree of long-term protectiveness for human health and the environment.

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STATUTORY DETERMINATIONS

As documented in **Section 7** of this ROD Amendment, the selected remedy satisfies the statutory requirements specified by the NCP [40 CFR Section 300.430(f)(5)(ii)]. The selected remedy is protective of human health and the environment, complies with all federal and state requirements that are applicable or relevant and appropriate to the RA, and is cost effective. This remedy uses permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment, and also reduce toxicity, mobility, or volume as a principal element. This remedy will result in contaminated debris and soil being dispositioned in accordance with the EPA-approved RODs for OU3 and OU5, respectively. This remedy may result in pollutants or contaminants, as defined by CERCLA, (i.e., contaminated soil and debris in the OSDF) remaining on-site, above health-based levels. Therefore, a review will be conducted every five years after commencement of RA to ensure that the remedy continues to provide adequate protection of human health and the environment.

All practical means to avoid or minimize environmental harm resulting from implementation of the selected remedy have been adopted. During excavation activities, sediment controls will be implemented to reduce the possibility of potential surface water runoff and sediment deposition to Paddys Run. Final site layout and design will include all practicable means (e.g., sound engineering practices and proper construction practices) to minimize environmental impacts.

In the OU4 ROD, DOE chose to complete an integrated CERCLA/National Environmental Protection Act (NEPA) process. This decision was based on the longstanding interest on the part of local stakeholders to prepare an Environmental Impact Statement (EIS) on the restoration activities at the FEMP and on the recognition that the draft document was issued and public comments received. Therefore, the document served as DOE's ROD for OU4 under both CERCLA and NEPA; however, it is not the intent of the DOE to make a statement on the legal applicability of NEPA to CERLCA actions.

Under NEPA, DOE is required to prepare a Supplemental EIS (SEIS) when it has made a substantial change in a proposed action, or if there are new significant circumstances in the proposed EIS action that are relevant to environmental concerns. Where the decision to prepare a SEIS is unclear, DOE NEPA regulations require the preparation of a "Supplement Analysis" (10 CFR Section 1021.314). The revised Silos 1 and 2 FS and PP also comprised the DOE's draft Supplement Analysis. Both documents were made available for public review and comment. Based upon the results of the Supplement Analysis, DOE has determined that there is no new information regarding the proposed alternatives for remediation of the Silos 1 and 2 material that would constitute a substantial change to the project scope or would be considered 'significant, new information' related to the environmental impacts from the EIS alternatives. Therefore, a SEIS is not required on the remediation of Silos 1 and 2 material.

The public has played a fundamental role in the remedial actions for OU4. DOE will sustain the same level of public involvement throughout the implementation of the Remedial Design/Remedial Action (RD/RA) activities, as was proven effective during the revised FS/PP and ROD Amendment process.

DOE is committed to maintaining public involvement through completion of the Silos 1 and 2 RD/RA activities. Per requirements under the NCP (40 CFR Section 300.435), DOE at a minimum will:

- Upon completion of the final engineering design, prepare a fact sheet describing the RD (40 CFR Section 300.435).
- Provide a public briefing upon completion of the final engineering design and prior to the beginning of the RA (40 CFR Section 300.435).
- Continue to provide project status through the Monthly Progress Briefings.

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ACRONYMS AND ABBREVIATIONS

A - M

ACA	Amended Consent Agreement
AEA	Atomic Energy Act
ARAR	applicable or relevant and appropriate requirement
AWWT	Advanced Wastewater Treatment
CAT	Critical Analysis Team
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, as amended
CFR	Code of Federal Regulations
CHEM1	Removal, On-site Chemical Stabilization — Cement-based, Off-site Disposal at the NTS
CHEM2	Removal, On-site Chemical Stabilization — Other, Off-site Disposal at the NTS
CMSA	consolidated metropolitan statistical area
COC	constituent of concern
D&D	decontamination and demolition
DOE	U.S. Department of Energy
DOE-FEMP	U.S. Department of Energy-Fernald Environmental Management Project
DOE-NV	U.S. Department of Energy-Nevada Operations Office
DOT	U.S. Department of Transportation
DWPF	Defense Waste Processing Facility
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FEMP	Fernald Environmental Management Project
FMPC	Feed Materials Production Center
FR	Federal Register
FS	Feasibility Study
FS/PP	Feasibility Study/Proposed Plan
ILCR	incremental lifetime cancer risk
IRT	Independent Review Team
LSA	low specific activity

ACRONYMS AND ABBREVIATIONS (cont.)

N - Z

NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NPL	National Priorities List
NTS	Nevada Test Site
O&M	operations and maintenance
OEPA	Ohio Environmental Protection Agency
OSDF	On-site Disposal Facility
OU	operable unit
PCDF	permitted commercial disposal facility
PEIC	Public Environmental Information Center
POP	Proof of Principle
PP	Proposed Plan
RA	remedial action
RCRA	Resource Conservation and Recovery Act, as amended
RI	Remedial Investigation
ROD	Record of Decision
RCS	Radon Control System
RTS	Radon Treatment System
SRS	Savannah River Site
TBC	to be considered
TCLP	Toxicity Characteristic Leaching Procedure
TTA	Transfer Tank Area
TVS	Oak Ridge Transportable Vitrification System
VIT1	Removal, On-site Vitrification – Joule-heated, Off-site Disposal at the NTS
VIT2	Removal, On-site Vitrification – Other, Off-site Disposal at the NTS
VITPP	Vitrification Pilot Plant
WAC	waste acceptance criteria

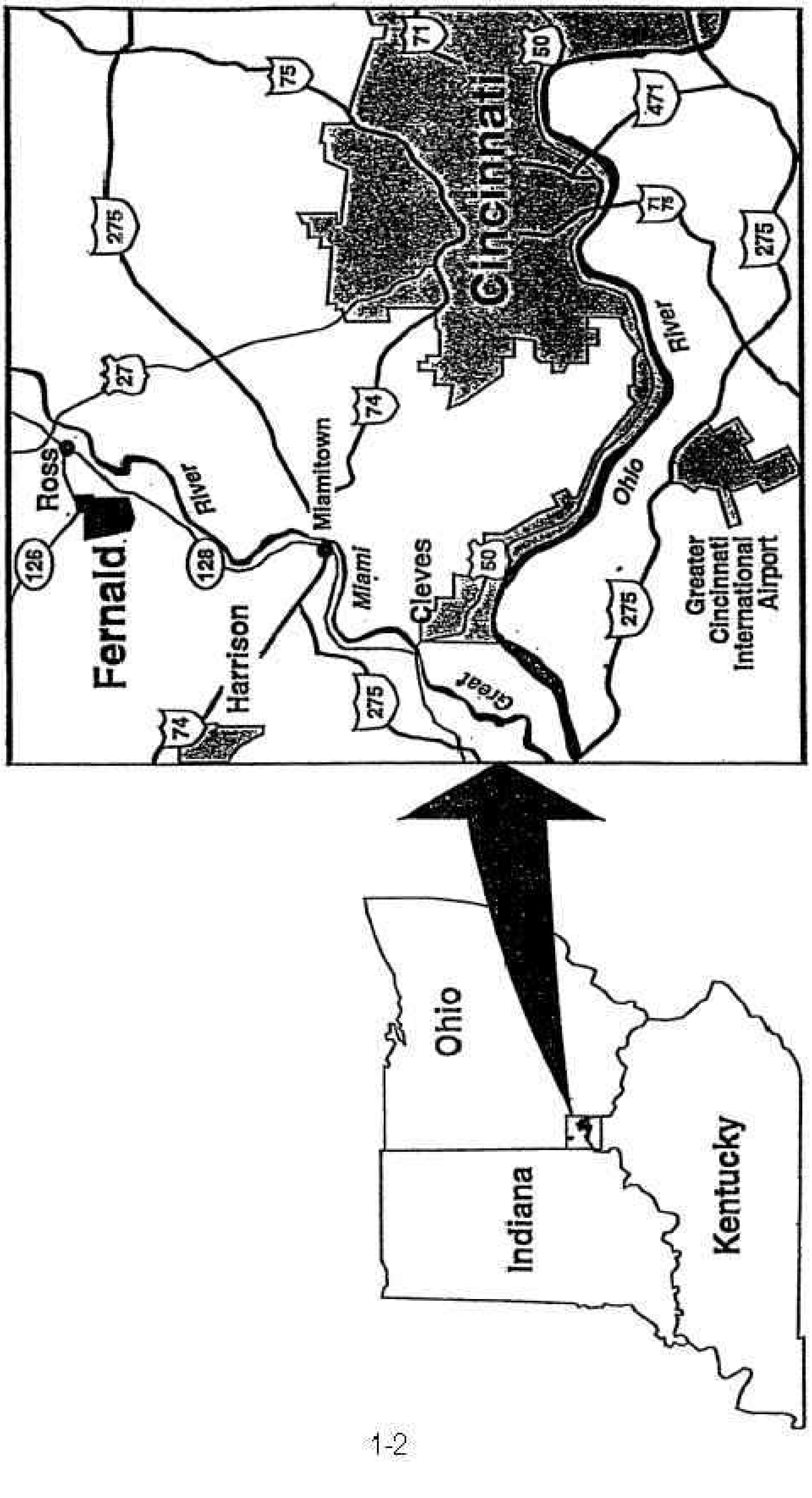
1.0 INTRODUCTION

1.1 Background

This Record of Decision Amendment for Remedial Actions at Silos 1 and 2 [hereinafter called "the ROD Amendment"] addresses the re-evaluation of the treatment component of the selected remedy for the remediation of the Operable Unit 4 (OU4) Silos 1 and 2 material at the U.S. Department of Energy's (DOE) Fernald Environmental Management Project (FEMP), formerly known as the Feed Materials Production Center (FMPC). Other components of the selected remedy for OU4 have not been reevaluated and remain as documented in the OU4 ROD. The FEMP is a 425-hectare (1,050 acre) former uranium processing facility located in southwestern Ohio approximately 18 miles northwest of the city of Cincinnati (see **Figure 1.1-1**). It is located just north of Fernald, Ohio, a small farming community, and lies on the boundary between Hamilton and Butler Counties. From 1952 until 1989, the FEMP site provided high purity uranium (U) metal products to support United States defense programs. Production was stopped due to declining demand and a recognized need to commit available resources to remediation. The FEMP site is included on the National Priorities List (NPL) of the U. S. Environmental Protection Agency (EPA). Inclusion on the NPL reflects the importance placed by the federal government on ensuring the expedient completion of cleanup operations at the FEMP. DOE owns the facility and is conducting cleanup activities at the site under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), as amended, and the DOE Environmental Restoration and Waste Management Program. The EPA and the Ohio Environmental Protection Agency (OEPA) support the DOE. Together, the three agencies actively promote local community and public involvement in the decision making process regarding the remediation of the FEMP site.

FIGURE 1.1-1

FEMP FACILITY LOCATION



1.2 OU4 Record of Decision

The decision documented by the OU4 ROD (EPA 1994) was based on the information available in the Administrative Record for OU4 and maintained in accordance with the CERCLA. The documents prepared through the CERCLA process include the Remedial Investigation (RI) [FEMP 1993a], the Feasibility Study (FS) [FEMP 1994a], and the Proposed Plan (PP) [FEMP 1994b] for OU4.

It is DOE policy to integrate the National Environmental Protection Act of 1969 (NEPA) into the procedural and documentation requirements of CERCLA whenever practical. The OU4 ROD and the other CERCLA documentation (RI, FS and PP) supporting remedial efforts at the FEMP site (including OU4) also include the appropriate NEPA evaluations. These integrated CERLCA/NEPA evaluations considered the potential impacts from remedial activities at the FEMP. The OU4 FS/PP-Environmental Impact Statement (EIS) [FEMP 1993b) and subsequent OU4 ROD served as U.S. Department of Energy-Fernald Environmental Management Project's (DOE-FEMP) ROD for OU4 under the CERCLA and NEPA. It was not the intent of the DOE-FEMP to make a statement on the legal applicability of NEPA to CERCLA actions.

The original remedy of vitrification was selected with consideration of stakeholder input including input received from public hearings held on March 21, 1994, in Harrison, Ohio and on May 11, 1994, in Las Vegas, Nevada and written comments received during the formal comment period. The OU4 ROD was approved by the EPA in December 1994.

1.3 Reason for Record of Decision Amendment

Pursuant to Section 117 of CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 Code of Federal Regulations (CFR) Section 300.435(c)(2)(ii), a ROD Amendment should be proposed when "differences in the remedial or enforcement action, settlement, or consent decree fundamentally alter the basic features of the selected remedy with respect to scope, performance, or cost."

The EPA determined that a ROD Amendment for the Silos 1 and 2 material was required, because of a significant cost increase associated with implementing the selected treatment remedy. The EPA determined that although some increase in remedial cost can be reasonably expected, the anticipated cost increase to implement joule-heated vitrification for treatment of the Silos 1 and 2 material constituted a fundamental change to the selected remedy and required a re-examination of the selected remedy and a ROD Amendment (EPA 1997a). DOE is issuing this ROD Amendment in accordance with the NCP [40 CFR Section 300.430(f)(5)].

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The *Revised Feasibility Study Report for Silos 1 and 2* (FEMP 1999a) [hereinafter referred to as the revised FS] and the *Revised Proposed Plan for Silos 1 and 2* (FEMP 1999b) [hereinafter referred to as the revised PP] included the DOE's NEPA Supplement Analysis. The revised FS and PP documents were made available for public review and comment. Under NEPA (10 CFR Part 1021), DOE is required to prepare a Supplemental EIS (SEIS) when it has made a substantial change in a proposed action, or if there are new significant circumstances in the proposed EIS action that are relevant to environmental concerns. Where the need to prepare a SEIS is unclear, DOE NEPA regulations require the preparation of a “Supplement Analysis" (10 CFR Section 1021.314). Based upon the results of the Supplement Analysis for Silos 1 and 2, DOE has determined there is no new information regarding the proposed alternatives for remediation of the Silos 1 and 2 material that would constitute a substantial change to the project scope or would be considered 'significant, new information' related to the environmental impacts from the EIS alternatives. Therefore, a SEIS is not required in order to amend the decision on the remediation of Silos 1 and 2 material.

This ROD Amendment summarizes key information that can be found in greater detail in the RI (FEMP 1993a), FS (FEMP 1994a), PP (FEMP 1994b), revised FS and revised PP. Details on obtaining information relevant to the Silos 1 and 2 remedial selection process is provided in **Section 8.2.**

This ROD Amendment, along with the revised FS, revised PP and supporting documents, are part of the Administrative Record in accordance with to 40 CFR Section 300.825(a)(2).

<END OF SECTION>

2.0 SITE BACKGROUND

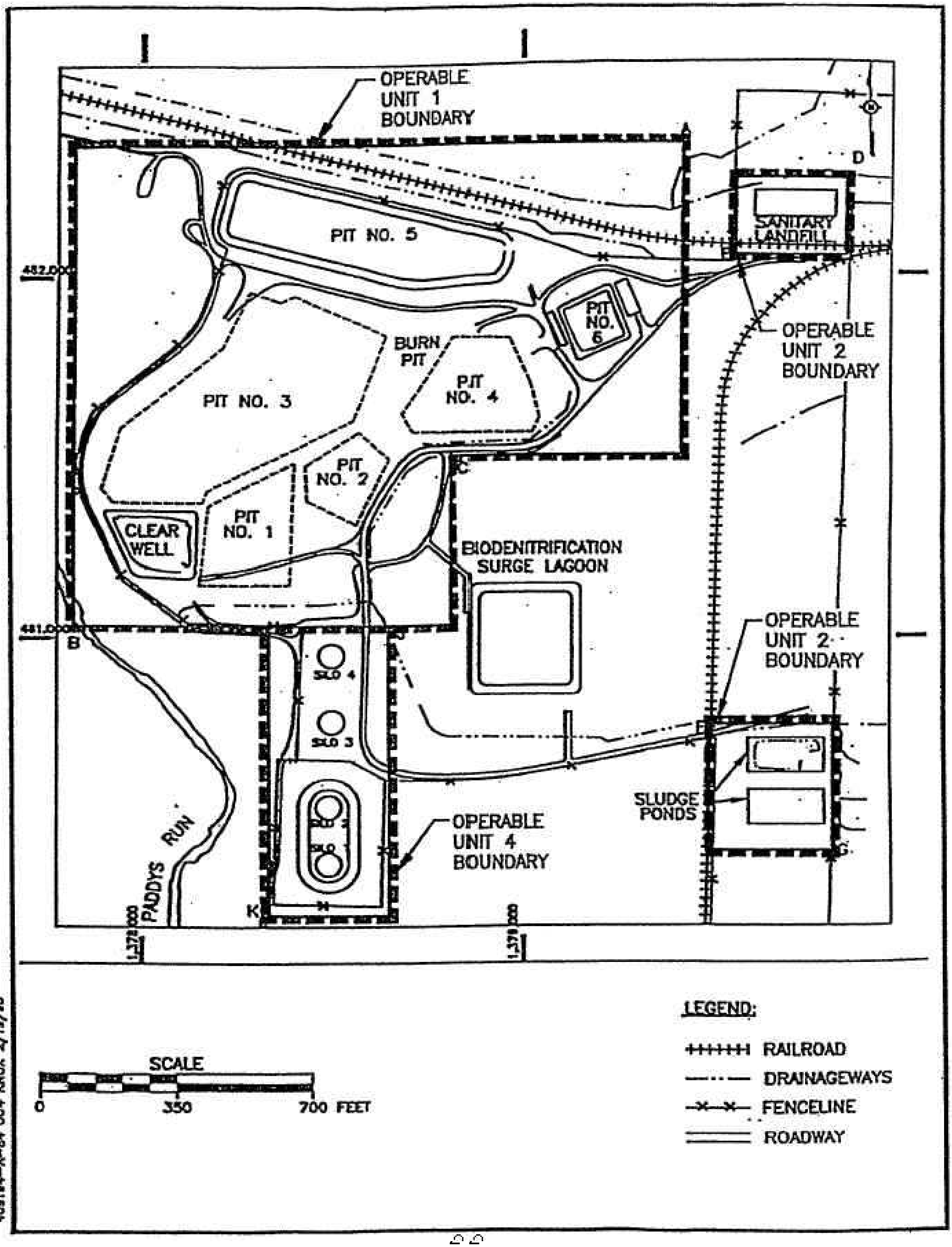
This section provides a brief summary of the history of the FEMP and description of OU4. A more detailed discussion can be found in Section 1 and Section F.2 of Appendix F of the revised FS.

The FEMP site was constructed from 1950 to 1951 under the authority of the Atomic Energy Commission, eventually known as the DOE. Between 1952 and 1989, the DOE-FEMP facility (then called the FMPC) produced high purity uranium metal products for the nation's defense programs. Production ceased in the summer of 1989 due to a declining demand for uranium feed product; and, plant activities turned their focus to environmental cleanup. In June 1991, the site was officially closed for production by an act of Congress. To reflect a new mission focused on environmental restoration, the name of the facility was changed to the FEMP in August 1991.

Production operations at the facility were limited to a fenced 55-hectare (136-acre) tract of land, now known as the former Production Area, located near the center of the FEMP site. Large quantities of liquid and solid materials were generated during production operations. Before 1984, solid and slurried materials from uranium processing were stored or disposed in the on-property Waste Storage Area. This area, located west of the former Production Area, includes six low-level radioactive waste storage pits; two earthen-bermed, concrete silos containing a total of 8,012 yd_3 of 11(e)(2) by-product material and 878 yd_3 of a protective BentoGrout™ clay (Silos 1 and 2); one concrete silo containing 5,088 yd^3 of cold metal oxides (Silo 3); one unused concrete silo (Silo 4); two lime sludge ponds; a burn pit; a clearwell; and a solid waste landfill (see **Figure 2.1-1**).

FIGURE 2.1-1

WASTE STORAGE AREA



In order to establish the legal framework by which to address the releases and threats of hazardous substances from containers and facilities at the FEMP, the DOE-FEMP (as the lead agency for the remediation of the FEMP site) and the EPA entered into a Consent Agreement in 1990, as amended (EPA 1991). The Consent Agreement as Amended Under CERCLA Sections 120 and 106(a) (ACA) is the legal basis that administratively governs the proper management and restoration of the FEMP site.

The facility and associated environmental issues of the FEMP site are being managed as five operable units (OUs) in order to promote a more structured and expeditious cleanup. An “OU” is a term employed under federal environmental regulation to represent a logical grouping of environmental issues at a cleanup site. Separate RI/FS documentation was prepared and issued for the five OUs at the FEMP. The five OUs, for which Rl/FS documents have been compiled, are defined within the ACA as:

- OU1: Waste Pits 1 through 6, the Clearwell, burn pit, berms, liners, and soil to a determined depth (estimated to be approximately 3 feet) beneath the waste pits.

- OU2: Other waste units including the flyash piles, other South Field disposal areas, lime sludge ponds, solid waste landfills, berms, liners, and soil within the OU boundary.

- OU3: Former production area and production-associated facilities and equipment (includes all above- and below-grade improvements). This includes, but is not limited to: all structures, equipment, utilities, drums, tanks, solid waste, waste product, thorium (Th), effluent lines, a portion of the Silos 1 and 2 material transfer line, wastewater treatment facilities, fire training facilities, scrap metal piles, feedstocks, and the coal pile.

- OU4: Silos 1, 2, 3, and 4, their contents, berms, and Decant Sump Tank System; Radon Treatment System (RTS); a portion of concrete trench and Silos 1 and 2 material transfer line within the boundary of OU4; miscellaneous pads and concrete structures; soils beneath and immediately surrounding Silos 1 through 4; and, perched groundwater in the vicinity of the silos that may be encountered during the implementation of cleanup activities.

- OU5: Environmental media including groundwater (both perched and the Great Miami Aquifer), surface water, soil not included in the definitions of OUs 1 through 4, sediment, flora, and fauna.

All five OUs (including OU4) completed the RI/FS process and have initiated remedial actions (RAs) in accordance with their respective EPA-approved final RODs. The original selected remedy for Silos 1 and 2 within OU4 is being modified through this ROD Amendment.

2.1 Contents of Silos 1 and 2

Silos 1 and 2 contain a total of 8,012 yd^3 of 11 (e) (2) by-product material and a total of 878 yd^3 of BentoGrout™ clay for a total volume of 8,890 yd^3. The BentoGrout™ clay layer was added in 1991 to the Silo 1 and 2 material in order to reduce the radon (Rn) emanation. Radionuclides at significant activity levels within these silos are actinium (Ac), radium (Ra)-226, Th-230, polonium (Po)-210, and a radioactive isotope of lead (Pb-210). These radionuclides are naturally occurring elements found in the original ores processed at the FEMP and Mallinckrodt.

Non-radiological constituents detected in significant concentrations in Silos 1 and 2 material include sodium, magnesium, nickel, barium, lead, calcium, iron, and tributyl phosphate (a solvent used in the former uranium extraction process at the FEMP). Tests performed on samples of stored material identified that lead can leach from the untreated material in concentrations that exceed typical federal guidelines for hazardous wastes.

The significant concerns associated with the Silos 1 and 2 material include:

- High concentrations of radionuclides, including Ra-226 and Th-230, that are present in the material;
- An elevated, gamma radiation field in the vicinity of the silos due to the material in the silos;
- Chronic emissions of Rn-222 (a radioactive gas from the decay of Ra-226) from Silos 1 and 2 material into the atmosphere;
- The structural instability of the silos dome and the age of the remaining portions of the structures; and
- The potential threat of the silos material leaching Resource Conservation and Recovery Act, as amended (RCRA) metals and radionuclides into the underlying sole-source aquifer.

2.1.1 Regulatory Classification of Silos 1 and 2 Material

Silos 1 and 2, known as the “K-65 Silos,” contain material generated from the processing of high-grade uranium ores termed pitchblende. This processing was performed to extract the uranium compounds from the natural ores. The Silos 1 and 2 material contains high activity concentrations of radionuclides, including Ra-226 and Th-230. The Silos 1 and 2 material was generated consequential to the processing of natural uranium ores and is therefore classified as by-product material, as defined in Section 11(e)(2) of the Atomic Energy Act, as amended (AEA).

The Silos 1 and 2 material is a complex wasteform from a regulatory perspective. Applicable or relevant and appropriate requirements (ARARs) for its remediation are identified in **Appendix A** of this ROD Amendment.

The material contained in Silos 1 and 2 is 11(e)(2) by-product material resulting from the processing of uranium ore concentrates. It is specifically exempt, as defined, from regulation as solid waste under the RCRA 40 CFR Section 261.4(a)(4). The referenced exclusion applies to "... source, special nuclear or by-product material as defined in the Atomic Energy Act of 1954 as amended, 42 U.S.C. 2011, *et seq*." Since a material must first be a solid waste in order to be a hazardous waste, and since the silos material is excluded from regulation as solid waste, the Silos 1 and 2 material cannot be regulated as hazardous waste under RCRA. Although the leachability of lead in the Silos 1 and 2 material exceeds the RCRA toxicity characteristic level, this does not cause the material to become subject to RCRA regulation, due to a hazardous waste characteristic. The metals are not from an external source, but are associated with the parent material [whose residues, including any ancillary metals, are excluded from the definition of solid waste pursuant to 40 CFR Section 261.4(a)(4)].

2.1.2 Packaging and Transportation of Treated Silos 1 and 2 Material

The Silos 1 and 2 material and secondary waste will be subject to regulations under the U.S. Department of Transportation (DOT) 49 CFR Subtitle B Chapter I Subchapter C, *Hazardous Materials Regulations.*

Federal Regulations promulgated by the DOT on September 28, 1995 [60 Federal Register (FR) 50292] categorize low specific activity (LSA) material into three classifications: LSA-I, LSA-II, and LSA-III. Evaluation of the radionuclide content for Silos 1 and 2 material indicates that this material meets one of the criteria for LSA-II material. Specifically, Silos 1 and 2 material is classified as LSA-II because "Class 7 (radioactive) material is essentially uniformly distributed and the average specific activity does not exceed $10^{-4} A_2$/g for solids" (49 CFR Section 173.403).[1] Therefore, the OU4 Silos 1 and 2 material is classified as LSA-ll material for proper packaging and transportation.

2.1.3 Disposal of Treated Silos 1 and 2 Material

As discussed in **Section 5**, all alternatives evaluated in the revised FS will dispose the treated Silos 1 and 2 material at the Nevada Test Site (NTS). The NTS is a DOE-owned and managed facility used for the disposal of selected low-level radioactive wastes from other DOE sites.

DOE derives authority from the AEA to manage small quantities of 11(e)(2) by-product material as "low-level waste" so that it may dispose of such small waste quantities at DOE low-level waste disposal facilities (e.g., NTS). Such quantities must not be "too large for acceptance at DOE low-level waste disposal sites," and such wastes must meet the requirements for low-level waste in accordance with DOE Order 435.1 Chapter IV(B)(4).

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1 The A^2 value is the maximum activity, in curies (Ci), of radioactive material, other than special form, low specific activity (LSA), or surface contaminated objects permitted in a Type A package. To be classified as LSA-ll material, the average specific activity must be less than one ten-thousandth (10^{-4}) of the calculated A_2 value per gram of material. As an example, if a material has a calculated A_2 value of 10,000 Ci, the average specific activity must be less than 1 Ci/g.

The treated Silos 1 and 2 material is 11(e)(2) by-product material and may be managed as a low-level waste pursuant to DOE Order 435.1. As a low-level waste, it must meet the NTS waste acceptance criteria (WAC) and, therefore, may not contain a RCRA listed waste, or exhibit a RCRA characteristic, regardless of the exclusion defined for by-product material at 40 CFR Section 261.4(a)(4).

DOE-FEMP will be responsible for demonstrating compliance with the NTS WAC. Specifically, DOE-FEMP will document the absence of the hazardous characteristics defined at 40 CFR Part 261 Subpart C, especially those toxic constituents identified in Table 1 of 40 CFR Section 261.24 that may have been used in a process, regardless of the waste's regulatory status. Upon successful review, the Department of Energy-Nevada (DOE-NV) Radioactive Waste Acceptance Program will document approval of the wastestrearn.

The CERCLA off-site rule [CERCLA Section 121(d)(3)] and implementing regulations 40 CFR Section 300.440) requires that waste from a RA that is shipped off-site for treatment and/or disposal be transferred only to those receiving units at a facility that (1) are operating in compliance with RCRA and other applicable federal and state requirements, and (2) do not have any uncontrolled releases of hazardous waste or constituents. The rule applies to any RA involving off-site treatment, storage or disposal of CERCLA waste, defined in CERCLA Sections 101(14) and (33); where the RA is being conducted pursuant to CERCLA.

In a letter dated July 7, 1998, the EPA Region IX granted approval to the NTS to dispose of CERCLA waste from DOE facilities in Area 3 and Area 5 Radioactive Waste Management Sites in accordance with the Off-site Rule (40 CFR Section 300.440). EPA Region IX, clarified their position in a letter dated December 4, 1998. The letter states that the CERCLA Off-site Rule approval for the NTS Area 3 and Area 5 Radioactive Waste Management Sites includes management of small volumes of 11(e)(2) by-product materials from Fernald OU4 as low-level waste under the provisions of Chapters III and IV of DOE Order 435.1 or any subsequent applicable DOE directive.

2.1.4 Disposal of Secondary Wastes

The selected remedy includes the decontamination and dismantlement (D&D) of all structures and remediation facilities and appropriate treatment and disposal of all secondary wastes. Secondary wastes generated during the treatment operations of the Silos 1 and 2 material or D&D activities, which cannot be disposed at the NTS without additional treatment, may be treated and/or disposed at an appropriately licensed off-site facility. Concrete from Silos 1 and 2 structures will undergo gross decontamination, demolition, size reduction, and packaging for shipment for off-site disposal at the NTS or an appropriately permitted commercial disposal facility (PCDF). Contaminated soils and debris, excluding concrete from Silos 1 and 2 structures, will be disposed in accordance with either the FEMP On-site Disposal Facility (OSDF) WAC or an appropriate off-site disposal facility, such as the NTS or a PCDF. Perched water encountered during remedial activities will be collected and directed to the FEMP OU5 water treatment facilities.

2.2 Decant Sump Tank System

The Decant Sump Tank System was an integral part of the former operations associated with Silos 1 and 2 and continues to collect groundwater beneath the two silos. Samples collected in 1991 from the water within the Decant Sump Tank System revealed elevated concentrations of Pb-210, Po-210, Ra-226, and U-235. Analytical results also revealed the presence of above-background concentrations of strontium (Sr)-90 and technetium (Tc)-99. With the exception of these latter two constituents, radiological contaminants present in the Decant Sump Tank System are consistent with the relative concentrations of constituents found in Silos 1 and 2. This result confirms that the Decant Sump Tank System is continuing to collect leachate from the underdrains in Silos 1 and 2, as it was designed to do. Sr-90 and Tc-99 were only detected in one decant sump tank sample and the concentrations were only slightly above the contract required detection limits. Sr-90 and Tc-99 are fission products and would not be present in the decant sump tank if the liquids consisted solely of leachate from Silos 1 and 2 collected via the silo underdrains. The presence of these radionuclides may have come from a number of sources other than leaching of radionuclides from the silo contents. These sources include: carry-over of other beta emitters during the laboratory chemical separation process (most probable source); infiltration of meteoric water into the Decant Sump Tank System; cross-contamination of the sample within the transport tanker prior to sample collection; or infiltration of perched groundwater into the decant sump tank.

The metals found in liquid samples from the Decant Sump Tank System include aluminum, antimony, arsenic, chromium, copper, lead, molybdenum, selenium, silver, vanadium, and zinc. In addition, 18 organic compounds were detected in the Decant Sump Tank System liquids at low concentrations. With the exception of toluene, all volatile compounds detected were at or below concentrations that allow a laboratory to accurately quantify the level of the constituents.

2.3 Radon Treatment System

The RTS was installed in November 1987, to reduce the radon inventory within the headspace of Silos 1 and 2. The RTS was sampled during a removal site evaluation in January 1992. Following the addition of BentoGrout™ clay to Silos 1 and 2 during Removal Action 4, the RTS was abandoned in place. The predominant contaminant present is Pb-210 and its associated decay products. Periodic surveys for direct radiation and removable fixed radioactive contamination reveal that only isolated contamination is present in accessible portions of the RTS.

2.4 Contaminated Environmental Media

In addition to the waste areas described, contamination is present in environmental media within the OU4 area, such as surface and subsurface soil, soils within the earthen berm surrounding Silos 1 and 2, groundwater, surface water, and perched water.

2.4.1 Principal Threats of Silos 1 and 2 and Related Systems

The NCP describes principal threats as those involving liquids, areas contaminated with high concentrations of toxic compounds, and highly mobile materials. The OU4 RI provided a detailed characterization of the Silos 1 and 2 material. The OU4 RI identified those contaminants that contributed to an incremental lifetime cancer risk (ILCR) value greater than the CERCLA criterion of 1×10^{-6} and a hazard quotient greater than the CERCLA criterion of 1.0. The OU4 RI identified the principal threats to human health and the environment posed by the Silos 1 and 2 material as being from the following four contaminant/transport pathways:

- Direct radiation
  - Direct exposure to gamma radiation from radioactive constituents within the silos.
  - Direct exposure to gamma radiation from radioactive constituents in surface soil.

- Air emissions
  - Dispersion of radon that escapes from the silos into the atmosphere.
  - Dispersion of volatile organic compounds or fugitive dust generated from soil.

- Surface water runoff
  - Erosion of contaminated soils into Paddys Run from the vicinity of the silos.

- Groundwater transport
  - Leaching of contaminants from the silos contents via soils to underlying groundwater.
  - Leaching of contaminants from the silos contents via soil to a sand silty/clay lens in the glacial till, which could carry contaminants to surface water and sediment in Paddys Run.

Potential remedial alternatives for OU4 were developed in order to mitigate the short-term and long-term exposure and associated risks from gamma radiation; reduce radon emanation rates from the Silos 1 and 2 material; minimize the leachability of contaminants from the waste material; eliminate potential of air dispersion from a silo collapse; eliminate the dispersion of fugitive dust generated from the soil; and, eliminate contaminated surface water runoff from contaminated soils into Paddys Run.

2.4.2 Overview of the Nature and Extent of Contamination

This section summarizes the nature and extent of contamination within environmental media in the OU4 study area. Also included in this section is an overview of the levels of direct radiation associated with the current conditions within OU4. Additional detail on these conditions is provided in Section 4.0 of the OU4 RI (FEMP 1993a).

2.4.2.1 Surface Soils

Sampling performed as part of the RFS and other site programs in the vicinity of OU4 indicates the occurrence of above background concentrations of uranium, and to a lesser degree, other radionuclides in the surface soils within and adjacent to the OU4 study area. These above-background concentrations appear to be generally limited to the upper six inches of soil. Available survey data and process knowledge do not indicate a direct relationship between the surface soil contamination in the OU4 study area and the silos contents.

Soil samples were also collected from the soils contained in the earthen embankment (berm) surrounding Silos 1 and 2. The analytical data from the berm fill show only slightly elevated radionuclide activity concentrations.

2.4.2.2 Subsurface Soils

As part of the OU4 RI, samples were collected from the subsurface soils located under and adjacent to Silos 1 and 2. Analytical results revealed elevated concentrations of radionuclides from the uranium decay series in the soils at the interface between the berm and the original ground level. Elevated concentrations (up to 53 pCi/g for U-238, about 40 times background) were also noted in slant boreholes, which passed in close proximity to the silos' underdrains.

2.4.2.3 Groundwater

With the exception of perched groundwater encountered during potential RA, groundwater within the Great Miami Aquifer underlying the silos area is not within the scope of OU4. Groundwater in the Great Miami Aquifer underlying the entire FEMP site is being addressed as part of OU5.

Uranium was the major radionuclide contaminant found in the perched water. Elevated concentrations of total uranium were detected in the slant boreholes under and around Silos 1 and 2.

2.4.2.4 Great Miami Aquifer

The concentration of total uranium in the upper portion of the Great Miami Aquifer, based on analysis of samples from the 2000-series wells, ranged from less than 1 µg/L to 40.3 µg/L. Both upgradient and downgradient wells contain above background concentrations of total uranium. Therefore, other sources of contamination must exist besides Silos 1 and 2.

2.5 Purpose and Need for Decision

Facilities and environmental media at the FEMP site, including OU4, contain radioactive and chemical constituents at levels that exceed certain federal and state standards, and guidelines for protecting human health and the environment. Currently, DOE-FEMP maintains custody of the property and restricts access with fences and security forces, precluding a member of the public from being exposed to site areas that have contamination.

The EPA has established a formalized risk assessment process to determine the necessity for implementation of cleanup actions. Under this process, several hypothetical scenarios that could expose members of the public to site contamination were examined. One of these scenarios assumed that site access was not controlled (i.e., unrestricted) and a member of the public could be exposed to the higher contamination areas. Results of the risk assessment performed for this hypothetical, unrestricted access scenario indicated that an individual establishing residence within the highly contaminated portions of the OU4 area, under existing conditions, would be subjected to an increased risk of incurring an adverse health effect. Risk assessment calculations performed for OU4 indicate the projected level of increased risk exceeds established federal regulatory guidelines. Based on the results of the baseline risk assessment, the DOE-FEMP concluded in the RI (FEMP 1993a) that existing site conditions warrant RA. A summary of the original assessment results can be found in Appendix F of the revised FS (1999a).

2.6 Description of the Original Selected Remedy

Based of the evaluation of remedial alternatives conducted in the FS/PP (FEMP 1994 a,b), the major components of the selected remedy documented in the OU4 ROD (EPA 1994) are as follows:

- Removal of the contents of the Silos 1, 2, 3 and the decant sump tank sludge.
- Treatment of the Silos 1, 2, and 3 material and sludges removed from the silos and the decant sump tank by vitrification to meet disposal facility WAC.
- Off-site shipment of the vitrified contents of Silos 1, 2, 3 and the decant sump tank for disposal at the NTS.
- Demolition of Silos 1, 2, 3 and 4 and decontamination, to the extent practicable, of the concrete rubble, piping, and other generated construction debris.

- Removal of the earthen berms and excavation of the contaminated soils within the boundary of OU4, to achieve remediation levels. Placement of clean backfill to original grade following excavation.

- Demolition of the remediation and support facilities after use. Decontamination or recycling of debris before disposition.

- On-property interim storage of excavated contaminated soils and contaminated debris in a manner consistent with the approved *Work Plan for FEMP Removal Action No. 17 - Improved Storage of Soil and Debris* (DOE 1996)[2], pending final disposition of soil and debris in accordance with the RODs of OUs 5 and 3, respectively.

- Continued access controls and maintenance and monitoring of the stored waste inventories.

- Institutional controls of the OU4 area such as deed and land-use restrictions.

- Potential, additional treatment of stored OU4 soil and debris using OU5 and OU3 waste treatment systems.

- Pumping and treating, as required, of any contaminated perched groundwater encountered during remedial activities.

- Disposal of the OU4 FEMP contaminated debris and soils consistent with the RODs for OUs 3 and 5, respectively.

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[2] This component of the selected remedy was documented in the Operable Unit 4 Record of Decision (ROD) in 1994. However, for purposes of this ROD Amendment the reference has been updated to the most recent revision.

Although the selected remedy for OU4 specifies on-site disposal for the OU4 soil and debris, the final decision regarding the final disposition of the OU4 debris and soils was placed in abeyance, until the OU3 and OU5 RODs were completed. This approach allowed DOE to take full advantage of planned waste management and treatment strategies developed by these OUs and enabled the integration of disposal decisions for OU4 contaminated soils and debris on a site-wide basis. The integration strategy for the OU4 contaminated soils and debris is discussed in more detail in **Section 4.0.**

<END OF SECTION>

3.0 BASIS FOR MODIFYING THE OU4 RECORD OF DECISION

3.1 Basis for ROD Amendment

3.1.1 Technical Basis for the Revised Path Forward

The technical basis for reevaluating the path forward for OU4 remediation, and ultimately modifying the ROD, is presented in detail in Section 1.1 of the revised FS. Following approval of the OU4 ROD, a treatability study program was initiated in May 1996 to collect quantitative performance data to support full-scale application of the joule-heated vitrification technology to the silos material.

During the treatability study program, many technical and operational difficulties were encountered. These technical and operational issues are discussed in detail in Section 1.1 of the revised FS, and in the VITPP Melter Incident Final Report (FEMP 1997b). Attempts to resolve these issues during Vitrification Pilot Plant (VITPP) operations resulted in documented schedule and cost increases.

In September 1996, the DOE requested that the EPA grant an extension of enforceable milestones associated with implementing vitrification of the silos material due to the aforementioned difficulties. In October 1996, the EPA denied DOE's request. Pursuant to the September 1991, Amended Consent Agreement, the EPA and DOE initiated the formal dispute resolution process and began reevaluating the remediation of the silos material. In November 1996, the DOE-FEMP formed the Silos Project Independent Review Team (IRT) as a technical resource to assist the DOE-FEMP in this re-evaluation. The IRT was comprised of technical representatives from throughout the DOE-FEMP complex and private industry with expertise in various aspects of chemical stabilization, vitrification, and other treatment technologies.

During the final stages of the last campaign of the VITPP to demonstrate lower temperature processing (<1200EC) of Silos 1 and 2 material, the melter hardware failed (December 26, 1996).

On July 22, 1997, the DOE-FEMP and the EPA signed an, "Agreement Resolving Dispute Concerning Denial of Request for Extension of Time for Certain OU4 Milestones" (EPA 1997b) [hereafter referred to as "the Settlement"]. The Settlement resolved disputes concerning the schedule and path forward for the remediation of the Silos 1, 2, and 3 materials. In the Settlement, EPA and DOE-FEMP agreed that DOE-FEMP would supplement the FS/PP so as to evaluate vitrification and other alternatives for treatment of the Silos 1 and 2 material. In addition, the EPA determined the remedial actions for Silo 3 could be separated from Silos 1 and 2 and an ESD would be sufficient to document the changes to the Silo 3 remedy.

An ESD was completed by DOE-FEMP and approved by the EPA in March 1998 to document the change in remedy for treatment and disposal of the Silo 3 material (FEMP 1998a).

The DOE-FEMP has prepared a revised FS and revised PP to recommend a RA for the Silos 1 and 2 material. The revised FS and the revised PP were made available for stakeholder review. The revised FS and revised PP provided the basis for selection of the final remedy, which is documented in this amendment to the OU4 ROD, for Silos 1 and 2. In addition, comments received from the OEPA and stakeholders on the revised FS and revised PP are addressed in **Section 6.0** and **Appendix B**, respectively, of this ROD Amendment.

As part of the revised path forward for Silos 1 and 2, a contract was awarded in February 1999 to retrieve the entire contents of Silos 1 and 2 and the Decant Sump Tank System and transfer it to a newly constructed, environmentally controlled Transfer Tank Area (TTA). This allows for storage of the material in a safer configuration than the Silos 1 and 2 structures while pending remediation by the selected treatment alternative. The contract award includes the construction of a radon control system (RCS) in conjunction with the TTA to control Rn-222 emanation during the retrieval and storage of Silos 1 and 2 material in the TTA. In addition, the RCS will control Rn-222 emanation during retrieval, treatment, and storage of Silos 1 and 2 material in the remediation facility.

3.1.2 Regulatory Basis for the ROD Amendment

In the Settlement, EPA directed DOE-FEMP to proceed with the development of a ROD Amendment for the Silos 1 and 2 material and an ESD for the Silo 3 material.

Pursuant with Section 117 of CERCLA and the NCP at 40 CFR Section 300.435(c)(2)(ii), a ROD Amendment should be proposed when "differences in the remedial or enforcement action, settlement, or consent decree fundamentally alter the basic features of the selected remedy [in the ROD] with respect to scope, performance, or cost."

The EPA determined that although some increase in remediation cost can be reasonably expected; in this specific case the final remediation cost estimated by DOE-FEMP for the Silos 1 and 2 material increased significantly [i.e., approximately greater than 3 times the original estimate]. Therefore, it was EPA's position that the significant anticipated cost increase changes - resulting from implementability issues with the treatment technology of joule-heated vitrification for the Silos 1 and 2 material - required a re-examination of the selected remedy and a ROD Amendment (EPA 1997a).

3.1.3 Basis for Modification of the Selected Remedy for Silos 1 and 2 Remedial Actions

This ROD Amendment modifies the treatment component of the selected remedy for Silos 1 and 2 material from vitrification to chemical stabilization. The modification of the treatment component is based on the conclusion that chemical stabilization satisfies both threshold criteria specified by the NCP and meets the statutory requirements of CERCLA. In addition, chemical stabilization attains Remedial Action Objectives identified in the OU4 ROD, and has an overall advantage over vitrification when evaluated against the five primary balancing criteria specified by the NCP. Specifically, the advantages of chemical stabilization in implementability and short-term effectiveness (worker risk and time to achieve protection) are judged to outweigh the advantages of vitrification due to its lower treated waste volume. The basis for this conclusion is presented in detail in **Section 5.** As documented in **Sections 6 and 8,** respectively, state and community acceptance have been addressed in accordance with the NCP.

3.2 Post-ROD Information Base

Since the approval of the OU4 ROD in December 1994 by the EPA, the DOE-FEMP has developed an expanded information base with respect to the various treatment technologies and their application toward the remediation of the Silos 1 and 2 material. This information has been used in the revised FS for the preliminary screening and re-evaluation of treatment technologies for the silos material. The various documents comprising this information base are identified in the revised FS bibliography and are part of in the Administrative Record and are available for inspection.

3.2.1 Vitrification Pilot Plant Final Reports

The FEMP joule-heated VITPP treatability study program consisted of three test campaigns with the following objectives: (1) to determine (using surrogates) whether it was more economical to vitrify the Silos 1, 2, and 3 materials together or separately; (2) to gain experience vitrifying silos material and handling high-sulfate, high-barium and lead concentrations, and BentoGrout™; and (3) to determine maximum production rates through induced agitation (via bubbling tubes) in the molten glass bath to increase production.

The results of the three test campaigns have been published in three separate *Operable Unit 4 Vitrification Pilot Plant* reports - Campaign 1, 3 and 4, respectively (FEMP 1996a, 1996b, 1997a). The results of the testing have been factored into the development of the alternatives' design basis, cost estimates, and the implementability evaluation for the vitrification technologies.

3.2.2 Melter Incident Report

The *VITPP Melter Incident Report* (FEMP 1997b) summarizes the findings of three investigative teams who evaluated the FEMP VITPP melter hardware failure and subsequent leakage of non-radioactive surrogate glass. The report identifies the causal and contributing factors that lead to the melter failure, and identifies lessons learned for any future applications of vitrification technology for the DOE-FEMP silos material or other areas in the DOE complex.

3.2.3 Independent Review Team Report

In November 1996, DOE-FEMP formed the Silos Project IRT to provide recommendations to them and the DOE-FEMP, as an aid in the internal decision process. Specifically, the IRT assisted and advised the DOE, the public and regulatory agencies in recommending a path forward for immobilization and disposal of the materials contained in Silos 1, 2 and 3 in OU4 of the FEMP.

The IRT was composed of 11 members, having backgrounds and experience in several areas including vitrification, glass furnaces and glass making, cementation, projects and project management, regulatory, environmental, and safety.

The IRT performed an independent analysis of the VITPP melter incident and other technical issues associated with the treatment of the Silos 1, 2 and 3 material. Based upon this analysis, the IRT published their final report (Silos Project IRT 1997) which identifies the IRT's recommendations for a path forward for remediation of the Silos 1, 2, and 3 material. The recommendations were based on the information provided through reports, discussions, presentations and site tours, and supplemented by individual knowledge and study.

The IRT was unable to reach unanimous consensus upon a recommended treatment process for the Silos 1 and 2 material. Both the majority and minority opinions are formally documented in the IRT final report.

3.2.4 Waste Vitrification Systems Lessons Learned

In March 1999, the DOE Office of Environment, Safety and Health published a report to present lessons learned in the design and operation of waste vitrification systems (DOE 1999). The report summarizes the joule-heated melter technology experiences from four low level waste vitrification facilities (Fernald VITPP, Savannah River Site (SRS) Vendor Treatment Facility, Oak Ridge Transportable Vitrification System (TVS), and Hanford Low-Level Vitrification Project). The report also summarizes technology experiences from four high-level waste vitrification facilities (SRS Defense Waste Processing Facility (DWPF), West Valley Demonstration Project Vitrification Facility, Sellafield - UK Waste Vitrification Plant, and Savannah River Stir Melter). The lessons learned have been used in the evaluation of the vitrification technologies in Section 3 of the revised FS.

3.2.5 Proof of Principle Testing Final Reports

In accordance with the July 22,1997, dispute settlement between the EPA and DOE- FEMP, the DOE-FEMP performed the Proof of Principle (POP) Testing Project to support the technical basis for the alternatives being evaluated in the revised FS. This testing was scoped and implemented to satisfy agency and stakeholder concerns that the detailed evaluation of the alternatives and comparative analysis be supported by pilot-scale data resulting from testing of proven and commercially available remedial technologies. The testing was performed using non-radioactive surrogates that simulated selected physical and chemical characteristics of the Silos 1 and 2 material.

The technologies of the POP Testing Project were based upon the preliminary screening and technology selection process described in Section 2 of the revised FS. The preliminary screening and technology selection process resulted in the identification of two technology families (vitrification and chemical stabilization) with two alternatives each, for detailed analysis in Section 3 of the revised FS. The following is a list of the technology families/stabilization alternatives evaluated in the revised FS:

- Vitrification – Joule-heated;
- Vitrification – Other;
- Chemical Stabilization – Cement-based; and
- Chemical Stabilization – Other.

3.2.6 U.S. EPA REACHIT Database

In August, 1999, an extensive search was conducted of the EPA's nationwide electronic database (REACHIT) of remedial sites where the vitrification, solidification/stabilization, and chemical stabilization treatment technologies have been applied to the remediation of material contaminated with lead and/or radioactive material. The database search identified a list of facilities where the technologies, at various stages of implementation, have been applied to wastestreams reasonably similar to the Silos 1 and 2 material. The results of the search have been used as part of the implementability evaluation of the technologies in Section 3 of the revised FS.

4.0 DESCRIPTION OF SIGNIFICANT DIFFERENCES OR NEW ALTERNATIVES

4.1 Description of the Originally Selected Remedy

The key components of the selected remedy documented in the OU4 ROD (EPA 1994) are as follows:

- Removal of the contents of the Silos 1, 2, and 3 and the Decant Sump Tank System sludge.
- Treatment of the Silos 1, 2, and 3 material and sludges removed from the silos and the Decant Sump Tank System by vitrification to meet disposal facility WAC.
- Off-site shipment of the vitrified contents of Silos 1, 2, and 3 and the Decant Sump Tank System for disposal at the NTS.
- Demolition of Silos 1, 2, 3 and 4 and decontamination, to the extent practicable, of the concrete rubble, piping, and other generated construction debris.
- Removal of the earthen berms and excavation of the contaminated soils within the boundary of OU4, to achieve remediation levels. Placement of clean backfill to original grade following excavation.
- Demolition of the remediation and support facilities after use. Decontamination or recycling of debris before disposition.

- On-property interim storage of excavated contaminated soils and contaminated debris in a manner consistent with the approved *Work Plan for FEMP Removal Action No. 17 - Improved Storage of Soil and Debris* (DOE 1996), pending final disposition of soil and debris in accordance with the RODs of OUs 5 and 3, respectively.[3]

- Continued access controls and maintenance and monitoring of the stored waste inventories.

- Institutional controls of the OU4 area such as deed and land-use restrictions.

- Potential, additional treatment of stored OU4 soil and debris using OU5 and OU3 waste treatment systems.

- Pumping and treating, as required, of any contaminated perched groundwater encountered during remedial activities.

- Disposal of the OU4 FEMP contaminated debris and soils consistent with the RODs for OUs 3 and 5, respectively.

Although the selected remedy documented in the OU4 ROD specifies on-site disposal for the OU4 soil and debris, the final decision) regarding the final disposition of the OU4 debris and soils was placed in abeyance, until the OU3 and OU5 RODs were approved by EPA. This approach allowed DOE to take full advantage of planned waste management and treatment strategies by these OUs and enabled the integration of disposal decisions for contaminated soils and debris on a site-wide basis.

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[3] This component of the selected remedy was documented in the Operable Unit 4 Record of Decision (ROD) in 1994. However, for purposes of the ROD Amendment the reference has been updated to the most recent revision.

4.2 The OU4 Modified Select ed Remedy

In accordance with the Settlement, the Silo 3 remedy was separated from Silos 1 and 2 remedy to reduce the technical uncertainties and programmatic risks of developing an effective treatment process for separate wastestreams with significant differences in chemical and physical properties. The change in remedy to chemical stabilization for Silo 3 is documented in an ESD approved by the EPA in March 1998 (FEMP 1998a).

The revised FS/PP reevaluated only the treatment component of the selected remedy for Silos 1 and 2 material. Based on evaluation of the treatment alternatives conducted in the revised FS/PP, the treatment component of the modified selected remedy for Silos 1 and 2 consists of:

- Complete removal of contents of Silos 1 and 2 and the Decant Sump Tank System sludge from the TTA, followed by treatment using chemical stabilization to stabilize characteristic metals to meet RCRA toxicity characteristic limits and attain the NTS WAC.

- Gross decontamination, demolition, size reduction, and packaging of concrete from Silos 1 and 2 structures followed by shipment for off-site disposal at the NTS or an appropriate PCDF.

- Disposal of contaminated soil and debris, excluding concrete from Silos 1 and 2 structures, in accordance with the FEMP OSDF WAC or an appropriate off-site disposal facility, such as the NTS or a PCDF.

The following components of the selected remedy for Silos 1 and 2 material have *not* been reevaluated and remain as documented in the OU4 ROD:

- Off-site shipment and disposal of the chemically stabilized waste at the NTS.
- Decontamination and dismantlement (D&D) of all structures and remediation facilities in accordance with the OU3 ROD.
- Removal of the earthen berms and excavation of the contaminated soils within the OU4 boundary, to achieve remediation levels in the OU5 ROD.
- Appropriate treatment and disposal of all secondary wastes at either the NTS or an appropriate PCDF.
- Collection of perched water encountered during remedial activities for treatment at OU5 water treatment facilities.
- Continued access controls and maintenance and monitoring of the stored waste inventories.
- Institutional controls of the OU4 area such as deed and land-use restrictions.

4.2.1 Removal of Silos 1 and 2 Material and Decant Sump Tank Contents

The material in Silos 1 and 2 and the sludge in the Decant Sump Tank System will be removed and placed in the TTA. Approximately 6,126 m^3 (8,012 yd^3) of 11 (e)(2) by-product material and 671 m^3 (878 yd^3) of BentoGrout™ clay from Silos 1 and 2 and 3,785 L (1,000 gallons) of sludge from the decant sump will be removed and placed in the TTA pending treatment by the selected remedy. The TTA will be equipped with a RCS designed to handle radon emissions generated during removal and storage.

4.2.2 Chemical Stabilization of Silos 1 and 2 and Decant Sump Tank Contents

The treatment component of the selected remedy consists of a chemical stabilization system to immobilize the constituents of concern (COCs) in Silos 1 and 2 material and the Decant Sump Tank System. For purposes of this selected remedy, chemical stabilization is defined as a non-thermal treatment process that mixes the Silos 1 and 2 material (including Bentogrout™) with a variety of chemical additive formulations (e.g., lime, pozzolans, gypsum, portland cement, or silicates) to accomplish chemical and physical binding of the COCs. The wastes removed from the TTA will be transferred to a chemical stabilization facility, which will be constructed on-site. The chemical binding of the COCs in the stabilized wasteform reduces their leach rate to meet the NTS WAC. In addition, the stabilized wasteform with sealed containerization reduces radon emanation to meet regulatory standards. Particulate released as a result of the stabilization process will be treated by an air emissions treatment system to satisfy all air-emission ARARs and TBCs. Radon emanated during the treatment process will be collected and routed to the TTA RCS.

4.2.3 Off-site Shipment and Disposal of Treated Material

Approximately 20,836 m^3 (27,254 yd^3) to 22,855 m^3 (29,895 yd^3) of stabilized material from Silos 1 and 2 and the Decant Sump Tank System will be generated during the treatment process. Containerization of treated waste to meet DOT shipping requirements and the NTS WAC will result in a disposal volume of approximately 33,144 m^3 (43,352 yd^3) to 36,431 m^3 (47,652 yd^3).

The NTS is a DOE owned and operated disposal site located near Las Vegas, Nevada. The treated waste will either be shipped to the NTS by truck or by intermodal transport (combination rail and truck).

The NTS is located approximately 3,219 kilometers (2,000 miles) from the FEMP. The FEMP has an approved NTS waste shipment and certification program for low-level radioactive waste that is periodically audited by the NTS. Disposal of treated Silos 1 and 2 material will be incorporated into this program. Technical oversight of the waste management activities at the NTS is provided by the State of Nevada.

Off-site shipments will comply with the DOT regulations found in 49 CFR Parts 171-178 pertaining to the transportation of hazardous and radioactive materials. Additionally, the packaged, treated Silos 1 and 2 material will meet the NTS WAC.

4.2.4 Soils and Debris

The OSDF will be available for disposal of debris from the existing Silos 3 and 4 structures and associated facilities (superstructures and RTS). Soil and debris from D&D activities associated with these facilities will be disposed in the OSDF if they meet the OSDF WAC for disposal. Any soils and debris that do not satisfy the OSDF WAC will be disposed at the NTS or an appropriate PCDF.

Criteria for disposal of waste materials into the OSDF are documented in the *Waste Acceptance Criteria Attainment Plan for the On-site Disposal Facility* (FEMP 1998b). The current version was issued in June 1998 following approval by the EPA and Ohio EPA. The OSDF WAC for debris were established in the OU3 ROD (FEMP 1996c). The OSDF WAC Attainment Plan provides that these criteria can be applied to debris for other OUs, including OU4, consistent with provisions of the ROD for each OU.

The OU3 ROD classified debris into ten distinct material categories based upon similar or inherent properties and configuration. Two categories, Category C – Process-related Metals and Category J – Product, Residues, and Special Materials, were administratively excluded from on-site disposal. In evaluating on-site disposal for concrete (Category E), the OU3 ROD focused primarily on structural concrete. The evaluation did not consider the potential impact of prolonged contact with residues or other contaminants, such as a concrete storage silo.

The concrete in Silos 1 and 2 has been in contact with contaminated material for over 30 years. Because of the relatively mobile COCs and the high moisture content associated with the Silos 1 and 2 material, there is a significant potential for migration of contaminants into the concrete. The depth and extent of the migration of the COCs into the concrete and the ability and cost of adequately decontaminating the concrete is uncertain.

Therefore, the concrete from Silos 1 and 2 is excluded from disposal in the OSDF. The concrete from Silos 1 and 2 will undergo gross decontamination followed by demolition, size reduction, and packaging for off-site disposal. Disposal of concrete from Silos 1 and 2 will be at the NTS or an appropriate PCDF.

Based on the current operating schedule, the FEMP OSDF may not be available for disposal of soil and debris generated from D&D of the Silos 1 and 2 remediation facilities. Therefore, for costing purposes, the revised FS and PP assume that all soil and debris from D&D of the OU4 remediation facilities will be disposed at the NTS. However, should programmatic changes occur and the OSDF become available, soil and debris meeting the OSDF WAC would be disposed in the OSDF in the same manner as discussed above for Silos 3 and 4 and associated facilities.

4.2.5 Perched Water

The OU5 RI/FS process examined perched groundwater on a site-wide basis. It should be noted, however, that in accordance with the ACA each OU must address perched groundwater envisioned to be encountered as a consequence of conducting RAs. An example of such an incidence is the collection of perched groundwater in deep excavations completed to remove underground tank systems (Silos 1 and 2 decant sump tank), pits, or foundations. This collected water will be directed to the FEMP OU5 wastewater treatment systems.

Process wastewaters generated during RAs conducted by all OUs will be directed to the OU5 treatment systems [i.e., the Advanced Wastewater Treatment (AWWT) facility]. OU5 has established pretreatment requirements to ensure that incoming wastewater streams do not exceed available treatment capabilities.

4.2.6 Cost

The total estimated cost for implementing the selected remedy that includes using a chemical stabilization technology to treat the Silos 1 and 2 material is approximately three-hundred ($300) million dollars. **Table 4.2-1** summarizes the major cost elements of the two alternative processes that represented the chemical stabilization technology in the revised Silos 1 and 2 FS. The cost estimates were prepared so as to define each cost element based on the preconceptual design specified in the revised Silos 1 and 2 FS. The cost estimates include capital costs, operation and maintenance (O&M) costs, waste shipping and disposal costs, D&D costs, engineering costs, project management costs, and the cost of borrowing money.

TABLE 4.2-1
COST ESTIMATE FOR THE REVISED REMEDY ($ MILLIONS)

Preferred Alternative	Chemical Stabilization	
Process Option	CHEM 1	CHEM 2
Capital Cost	55	56
Operation and Maintenance Cost	77	83
Waste Shipping and Disposal Cost		
Packaging	34	33
Transportation	14	13
Disposal	10	9
D&D Cost	34	36
Engineering Cost	24	24
Project Management Cost	21	21
Cost of Money	28	28
Summary Cost (un-escalated)	297	303

4.2.7 Measures to Control Environmental Impacts

In accordance with DOE regulations for implementing the NEPA (10 CFR Part 1021), DOE has factored environmental impacts into the decision making process for the OU4 RA. All practical measures will be employed at the FEMP site to minimize environmental impacts to human health and the environment during the implementation of the OU4 RA.

Measures to control environmental impacts will be implemented during RD and the RA to minimize impacts to natural resources (e.g., wildlife and wildlife habitat, cultural resources, wetlands, surface water, groundwater). OU4 remedial activities will not impact floodplain areas at the FEMP. Although the 100 to 500-year floodplain of Paddys Run is located near the silos and associated support facilities, direct physical impact to the floodplain will not occur. The implementation of engineering controls will minimize any indirect impact such as runoff and sediment deposition to the floodplain. In addition, changes in flood elevation will not occur. The following provides is a discussion of the measures that will be taken to minimize impacts to human health and the environment on and adjacent to the FEMP site.

Excavation activities and the construction and operation of the various support facilities (e.g., waste processing facility and storage facility) will result in the disturbance of approximately 1.0 hectare (2.5 acres) of terrestrial and managed field habitat and the potential for increased erosion and sediment loads to surface water (i.e., Paddys Run). However, appropriate engineering controls such as silt fences, vegetative cover, and runoff control systems will be used to minimize runoff to Paddys Run and its associated aquatic habitat, including the state-threatened Sloan's crayfish (orconectes sloanii). In addition, appropriate air emission treatment systems will be used during the operation of the chemical stabilization facility to minimize the potential for increased emissions to the ambient air and resulting impacts to on-site and off-site personnel and to surrounding riparian habitat.

Groundwater, surface water, and air monitoring will be performed before, during, and after remedial activities. If adverse effects are detected in any of these environmental media, work will be immediately stopped until the effects are controlled and/or the appropriate response actions are executed.

The selected remedy for OU4 includes the removal of the contaminated surface soil from the entire OU4 area and re-grading with clean fill material, as required. Therefore, the primary residual contaminant would be uranium, below the final remediation level established in the OU5 ROD (FEMP 1996c) for the subsurface soil. Because the contact of ecological receptors is limited (near background levels) to surface soil and surface waters, residual ecological risks associated with the OU4 preferred alternative would be indistinguishable from those risks posed by background levels in the soil.

<END OF SECTION>

5.0 DESCRIPTION AND EVALUATION OF ALTERNATIVES

5.1 Treatment Alternatives for the Silos 1 and 2 Material

The Detailed Analysis in the revised FS evaluated vitrification and chemical stabilization, using two of the commercially available process options for each treatment technology. Two representative process options were chosen for chemical stabilization and vitrification, in order to provide a balanced analysis of the two technologies against the NCP evaluation criteria. The preconceptual designs used in the revised FS are based upon data and design information developed from POP testing and have been developed as viable ways to remediate the Silos 1 and 2 material. Although two options for each technology were selected for the analysis, equivalent commercially demonstrated processes that are consistent, with the selected remedy, will not be precluded from consideration, consistent with the final selected remedy, during remedial design.

In the detailed analysis, no significant differences were identified to provide a compelling reason to select a given process option (i.e., CHEM1 vs. CHEM2, or VIT1 vs. VIT2) over another process option. For this reason, the Comparative Analysis of Alternatives in the revised FS, which is summarized in this section, compared the vitrification and chemical stabilization technologies.

5.2 Evaluation Criteria

Section 4 of the revised FS presents a comparative analysis of alternatives for the treatment of the Silos 1 and 2 material with respect to the nine evaluation criteria specified by the NCP to meet the requirements of CERCLA.

The NCP divides the evaluation criteria used in this comparative analysis into three categories: threshold, primary balancing, and modifying criteria. More detailed definitions of the evaluation criteria can be found in Section 3.1.2, Overview of the Detailed Analysis of the revised FS.

Threshold criteria consist of the two criteria that must be satisfied in order to be the selected alternative:

- Overall protection of human health and the environment; and

- Compliance with ARARs.

These criteria are of greatest importance in the comparative analysis because they reflect the key statutory mandates of CERCLA, as amended. An alternative must satisfy both of these *threshold criteria* before it is eligible to be selected as the final remedy.

Primary balancing criteria consist of the five criteria under which the relative advantages and disadvantages of the alternatives are compared to determine the best overall remedy:

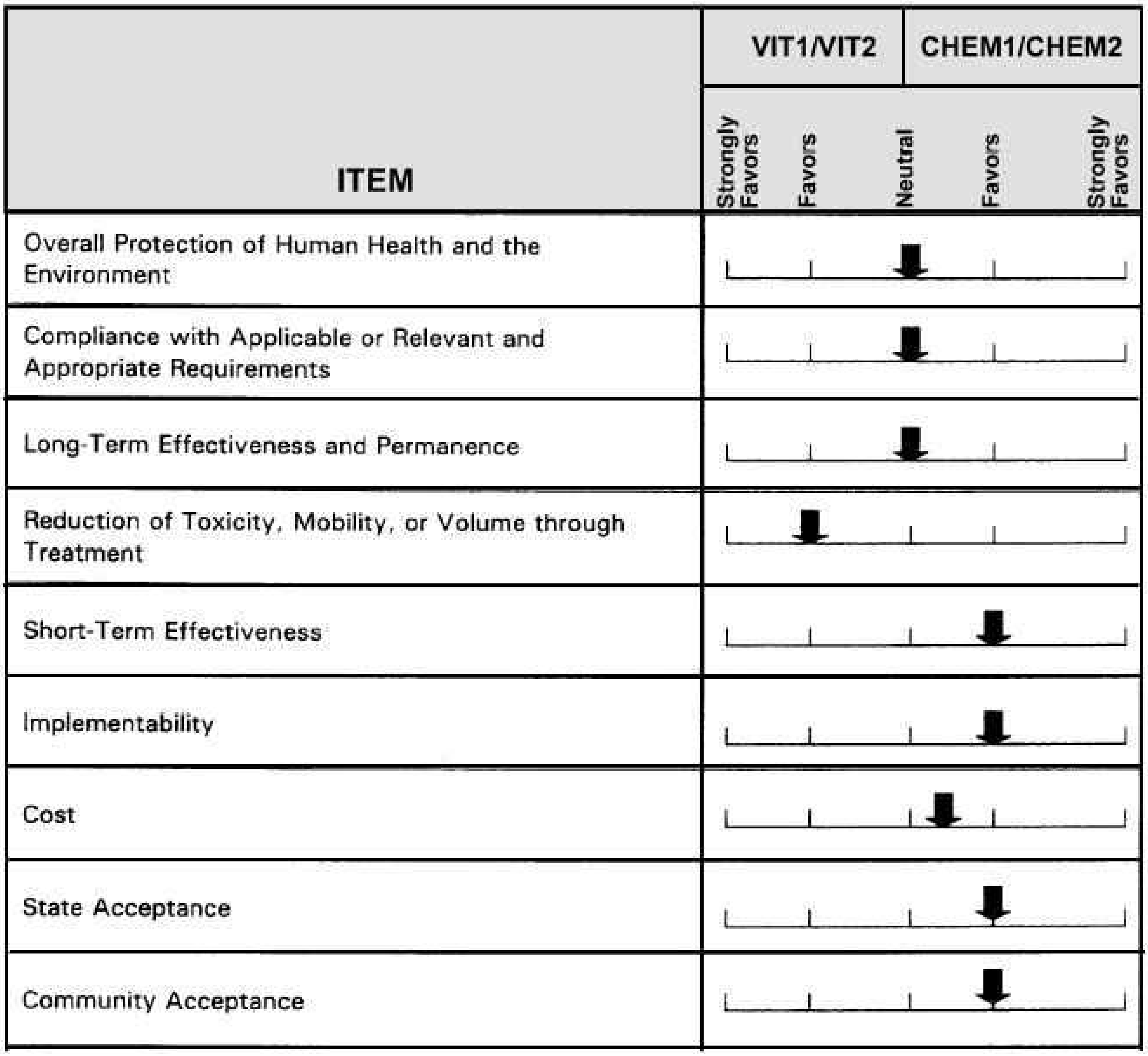
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Implementability; and
- Cost.

The first and second balancing criteria reflect the statutory preference for treatment as a principal element of the remedy and the bias against off-site land disposal of untreated material. Together with the third and fourth balancing criteria, they form the basis for determining the general feasibility of each potential remedy. In addition, the primary balancing criteria are used to determine whether costs are proportional to the overall protectiveness, considering both the remediation activity and the time period following restoration of the OU4 area. By this approach, it can be determined whether a potential remedy is cost-effective.

The final two criteria, identified in the NCP as *modifying criteria*, are state acceptance and community acceptance. These two criteria are evaluated based on input received from the state and public through comments on the revised FS and PP. These comments are addressed in this ROD Amendment in **Section 6** and **Appendix B**, respectively.

Figure 5.2-1 summarizes the comparative analysis of the alternatives.

**FIGURE 5.2-1
COMPARATIVE ANALYSIS SUMMARY**



The Comparative Analysis summarized in this section, is documented in detail in Section 4 of the revised FS.

5.2.1 Threshold Criteria

5.2.1.1 Overall Protection of Human Health and the Environment

Both vitrification and chemical stabilization provide overall protection of human health and the environment. Both alternatives limit exposure to contaminants by removing the sources of contamination, effectively treating the source materials to minimize the mobility of contaminants, and disposing the treated material in a protective manner off-site at the NTS.

The nature and extent of impacts to biota from implementing the technologies are similar. Each alternative involves site preparation and construction for a processing facility, removal of the silos material from the TTA, remediation of the silos material, and transport of the treated material to the NTS for disposal. Short-term impacts include the temporary loss of habitats at the FEMP site and possible impacts from accidental spills of construction and operation materials. Mitigative measures would be employed to minimize these short-term risks.

5.2.1.2 Compliance with ARARs

The vitrification and chemical stabilization technologies attain the threshold criterion of compliance with ARARs. A comprehensive list of ARARs is presented in **Appendix A** of this ROD Amendment. Key requirements are discussed in Section 3 of the revised FS within the evaluation of each alternative against this criterion. The following paragraphs summarize those evaluations.

Chemical-specific ARARs

Both vitrification and chemical stabilization technologies meet the chemical-specific ARARs associated with potential releases to groundwater, surface water, and air. The most critical chemical-specific ARAR is the radon flux limit (specified in the National Emissions Standards for Hazardous Air Pollutants, 40 CFR Part 61 Subpart Q) of 20 picoCuries per square meter· second ($pCi/m^2 \cdot s$) . This limit applies to interim storage or final disposal of Silos 1 and 2 material. Both alternatives meet this ARAR during interim storage and after disposal. Both alternatives meet requirements for control of radon, particulate, and other air emissions from remedial activities by incorporating air emission treatment. The impact of radon emissions during remediation is evaluated as part of the short-term effectiveness criterion.

Location-specific ARARs

Vitrification and chemical stabilization technologies meet the location-specific ARARs as they relate to floodplains, wetlands, and endangered species and their habitats. Compliance with these alternatives is met through proper planning, siting, design, and operational procedures.

Action-specific ARARs

Vitrification and chemical stabilization technologies meet the action-specific ARARs identified for these alternatives. Appropriate engineering controls are implemented for each alternative to comply with Ohio Water Quality Standards and Air Quality Standards. Hazardous material transportation requirements are complied with by following the regulations under 40 CFR Parts 262 and 263, and the appropriate DOT shipping standards under 49 CFR Subchapter C Hazardous Materials Regulations.

5.2.2 Primary Balancing Criteria

5.2.2.1 Long-term Effectiveness and Permanence

Both vitrification and chemical stabilization technologies ensure long-term protectiveness of human health and the environment through treatment. Toxicity Characteristic Leaching Procedure (TCLP) analysis indicates that the vitrification and chemical stabilization process options evaluated during POP testing produced wasteforms that consistently met the NTS WAC and were durable based on leach rate data. The TCLP test is used to simulate the leaching effects of acidic groundwater infiltrating the disposal cell and contacting disposed waste. This test measures the ability of the stabilized waste particles to resist leaching even if the original wasteform (e.g. monolith) has been compromised.

Both alternatives include treatment that permanently reduces the leachability of COCs. Off-site disposal at the NTS provides additional protection by eliminating access to the treated materials and preventing migration of constituents from the materials. Location of the NTS disposal facility in a sparsely populated, arid environment reduces the potential for leachate generation, contaminant migration, and prevents direct contact with contaminants. Because the NTS is owned and maintained by DOE and used for the disposal of low-level wastes from other DOE sites, the uncertainties associated with institutional controls are minimal. As the result of a low average annual precipitation and depth to groundwater, impacts to human health and the environment from possible engineering and institutional controls failure are minimal.

There are no long-term environmental impacts at the FEMP site pertaining to the removal and treatment of Silos 1 and 2 material. The projected FEMP site residual risk to viable receptors is less than the NCP criterion of 10^{-6} ILCR, and non-carcinogenic effects are expected to be below 1.0 (HI) specified by the NCP for both alternatives. Long-term environmental impacts at the NTS involve some permanent disturbance of soils (i.e., acquisition of borrow material) associated with disposal activities. Significant long-term impacts are not expected to water quality or hydrology, air quality, biotic resources, socioeconomics or land use, or cultural resources. Wetland or floodplain areas have not been delineated at the NTS.

Long-term effects of waste disposal and necessary engineering and administrative controls that need to be incorporated into the design of the disposal cell will be determined based on results of a performance assessment (PA) conducted by the NTS. The NTS has previously conducted a PA on the Area 5 Radioactive Waste Management Site (Area #5). The PA resulted in the establishment of volumetric radionuclide concentration limits for acceptance for disposal in Area #5.

An informal review of the Area #5 PA indicates that chemical stabilized Silos 1 and 2 waste would meet the radionuclide concentration limits. Upon finalization of this ROD Amendment, a formal review of the treated Silos 1 and 2 waste against the Area #5 concentration limits will be conducted to determine if Area #5 at the NTS remains suitable for disposal of treated Silos 1 and 2 waste. If treated Silos 1 and 2 waste fail to meet the radionuclide concentration limits for Area #5, a PA specific to the characteristics associated with treated Silos 1 and 2 waste will be conducted by the NTS in accordance with DOE Order 435.1.

The three discriminating criteria for comparison of vitrification and chemical stabilization were determined to be reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. **Figure 5.2-2** presents a summary of the comparison of the vitrification and chemical stabilization technologies against these criteria, as well as each criterion's subcriteria.

5.2.2.2 Reduction of Toxicity, Mobility, or Volume through Treatment

Overall, this criterion favors vitrification due to the reduction in treated material volume.

Figure 5.2-3 presents a comparison of the expected primary and secondary waste disposal volumes associated with the vitrification and chemical stabilization alternatives. This figure illustrates that, while vitrification results in a reduction in volume of the Silos 1 and 2 material, addition of the chemical fixatives and additives in the chemical stabilization process results in an increase in volume of the treated material compared to the volume of untreated material. Both of the technologies provide treatment that substantially reduces the mobility of COCs in the Silos 1 and 2 material through treatment. Toxicity Characteristic Leaching Procedure (TCLP) tests conducted on the treated surrogate material during POP testing indicate that either alternative can reduce the leachate concentrations of hazardous metals to below RCRA toxicity characteristic limits. Vitrification chemically binds the contaminants in a glass-like matrix that significantly reduces contaminant mobility. Chemical stabilization reduces the mobility of contaminants by converting the contaminants into a less soluble form and binding them into a stabilized matrix.

FIGURE 5.2-2
SUMMARY OF DISCRIMINATING CRITERIA AND THEIR COMPONENTS

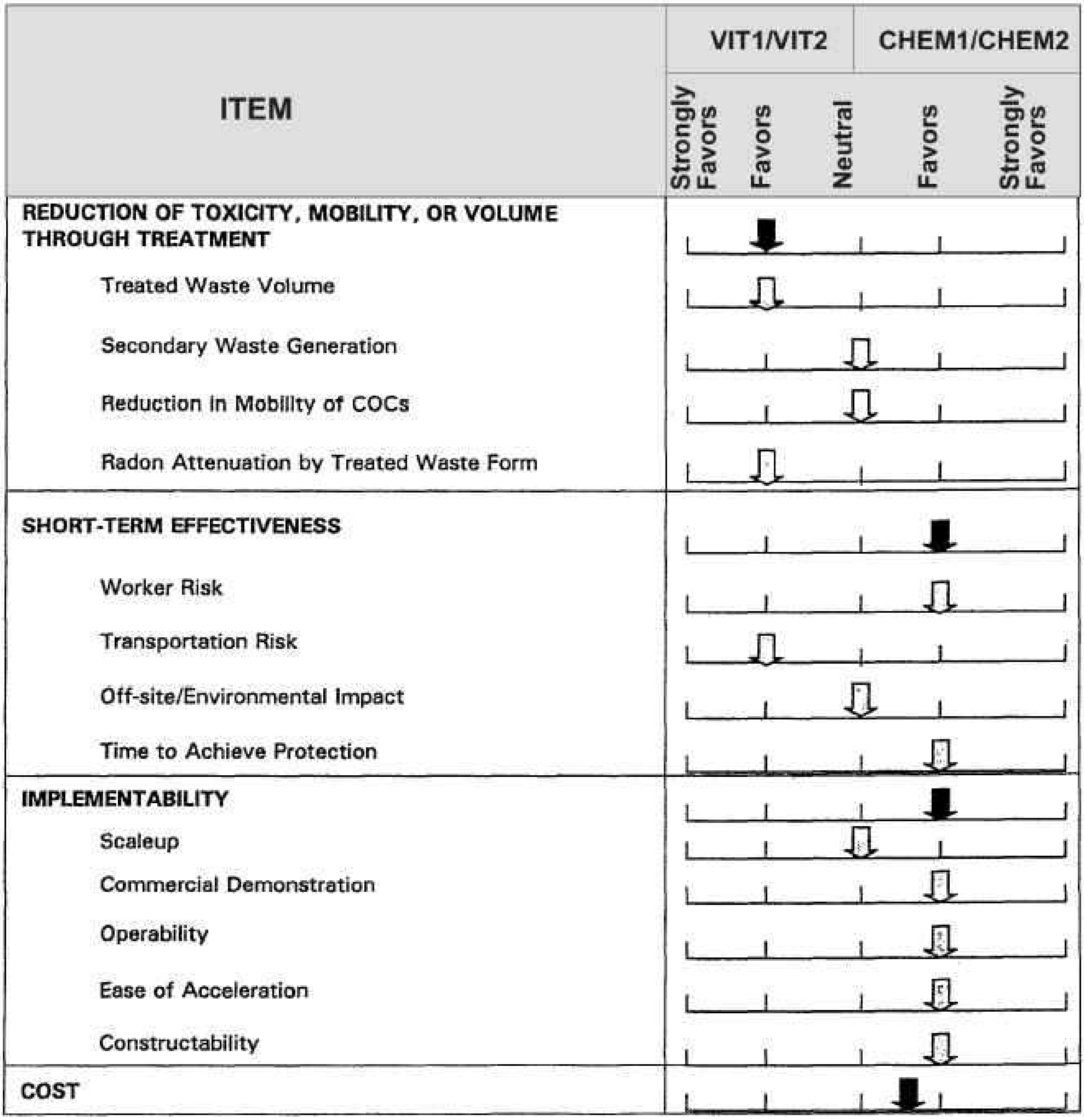
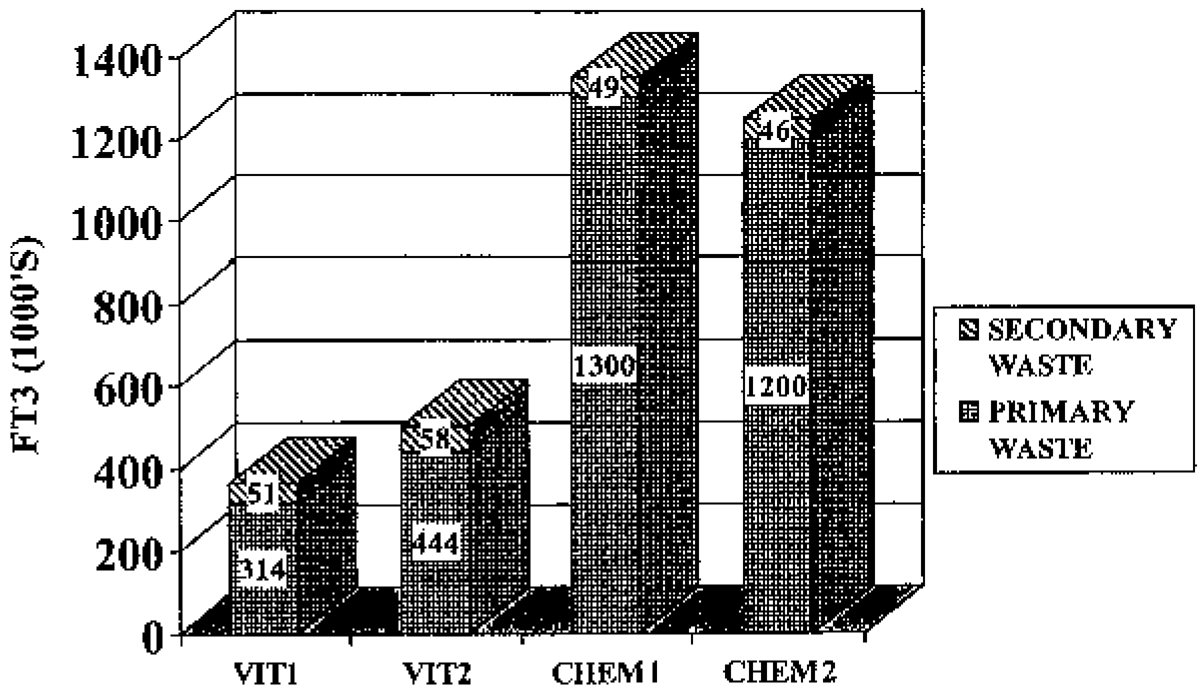


FIGURE 5.2-3
TOTAL SOLID WASTE VOLUME SUMMARY



The vitrified Silos 1 and 2 material reduces radon emanation more effectively than does the chemically stabilized material. However, the combination of radon mitigation provided by the chemically stabilized material plus the engineered barriers and packaging associated with the disposal of treated materials, effectively controls radon emanation. Both alternatives provide effective control of radon emanation from the treated Silos 1 and 2 material. The impact of radon emissions during remediation is evaluated as part of the short-term effectiveness criterion.

5.2.2.3 Short-term Effectiveness

The NCP identifies the components of short-term effectiveness as short-term risks to the community during implementation of the alternative; potential impacts to workers during RA; potential environmental impacts during implementation; and time until protection is achieved. Although each alternative is favorable in individual aspects of short-term effectiveness, from an overall perspective, this criterion favors chemical stabilization due to lower on-site worker risk and higher schedule certainty. The basis for determination of risks is detailed in Appendices B and E of the revised FS.

Worker Risk

Vitrification presents an increased non-radiological risk to the worker during on-site operations due to the greater number of person-hours estimated to complete remediation and increased physical hazards in the work place. An occupational hazard analysis was performed on the proposed design for each alternative (Appendix B of the revised FS). The hazard analysis evaluated the potential physical and chemical hazards to the workers involved with the on-site O&M activities. **Table 5.2-1** presents a summary of the discriminating hazards posed to workers as determined by the analyses of the alternatives.

TABLES 5.2-1
SUMMARY OF KEY HAZARDS TO ON-SITE WORKERS

Physical hazards due to vehicle and container movement	Greater hazard for chemical stabilization due to greater number of containers
Falls	Greater hazard for vitrification - more elevated equipment
Exposure to hazardous chemicals and toxicants	Greater hazard for vitrification - toxic constituents (SO_x, NO_x, lead - storage of caustic for scrubber, and gases)
Electrical shock	Greater hazard for vitrification - higher power requirements, more complex electrical system
Human hazards	Greater hazard for vitrification - greater number of work hours
High or changing pressure	Greater hazard for vitrification - remote potential for over-pressurization of the melter; potential releases from Emergency Off-gas System
Thermal hazards	Greater hazard for vitrification - high temperature in melter; handling of molten glass; high temperature off-gas
Spills/loss of containment	Greater hazard for vitrification - molten glass, toxic off-gas constituents, higher radon concentrations and caustic storage result in greater consequences for spills, leaks, etc.

The vitrification process liberates essentially all of the radon from the Silos 1 and 2 material during the treatment process. Chemical stabilization liberates less radon during the treatment process, but continues to generate radon during subsequent product handling operations. In both cases, sufficient radon control is provided to mitigate radon releases and attain environmental and worker protection limits. The calculated radon concentrations due to projected routine emissions for either alternative show no measurable impact to FEMP fenceline radon concentrations.

Both vitrification and chemical stabilization are able to meet the radon flux limit of 20 $pCi/m^{2} \cdot s$ during interim storage at the FEMP and after disposal. Sufficient attenuation of radon is provided by the vitrified material without reliance on the packaging or disposal configuration. Although the chemical stabilization process provides attenuation of radon, it is reliant on packaging to meet the radon flux limit.

<u>Transportation Risk</u>

Appendix E of the revised FS evaluates the short-term risks associated with the transportation, both by direct truck and intermodal shipments, of the treated silos material to the NTS. The implementation of either transportation option presents a minimal risk to the public, within the CERCLA target risk range of $1x10^{-4}$ to $1x10^{-6}$. However, due to the greater number of shipments required to ship the larger volume of treated material, the transportation risk is incrementally higher for chemical stabilization.

For both technologies, transportation to the NTS complies with DOT regulations and DOE guidelines. The transportation of the Silos 1 and 2 material to the NTS by either truck or intermodal shipments is protective of human health and the environment. In addition, the anticipated shipping rate of 7 to 20 shipments per week does not represent a significant impact on total highway traffic.

<u>Off-site Environmental Impact</u>

Short-term impacts associated with both technologies include temporary disruption of several acres of land at the FEMP site for construction of the treatment facility and material handling. There is a potential for increased fugitive dust during construction activities; however, appropriate controls minimize the potential short-term impacts.

Time to Achieve Protection

Due to a shorter design-construction start-up period, and a more feasible schedule acceleration, chemical stabilization is preferred with respect to time to achieve protection. **Figure 5.2-4** presents a comparative summary of each alternative's schedule.

The time period between the approval of the ROD Amendment and the initiation of treatment operations (i.e., design, construction, construction acceptance testing, preoperations, and start-up) for the Silos 1 and 2 remediation is estimated to be 62 months for vitrification, compared to 54 months for chemical stabilization. The difference of eight months between the two schedules is primarily attributed to the time required, based upon lessons learned during start-up of DOE vitrification facilities, to perform Proof of Process testing during start-up of the vitrification facility. In addition, the technical risk evaluation results in a calculated schedule uncertainty of 14-16 months for vitrification compared to 8-10 months for chemical stabilization.

While vitrification requires full-time (24 hr/day, 7 days/wk) operation to complete treatment within the three-year period evaluated in the revised FS, chemical stabilization can complete treatment within three years with less than full-time operation (e.g., 16 hrs/day, 5 days/week and 24 hrs/day, 5 days/week). Less than full-time operation would leave 'excess' operating time (shifts per day or days per week) available to recover from unplanned downtime. This excess operating time results in higher confidence in the ability of the chemical stabilization alternative to complete treatment within a given timeframe. **Figure 5.2-5** presents the total operating hours required to treat the Silos 1 and 2 material in three years at the scale proposed by the POP vendors.

FIGURE 5.2-4
TIME TO ACHIEVE PROTECTION
SCHEDULE COMPARISON

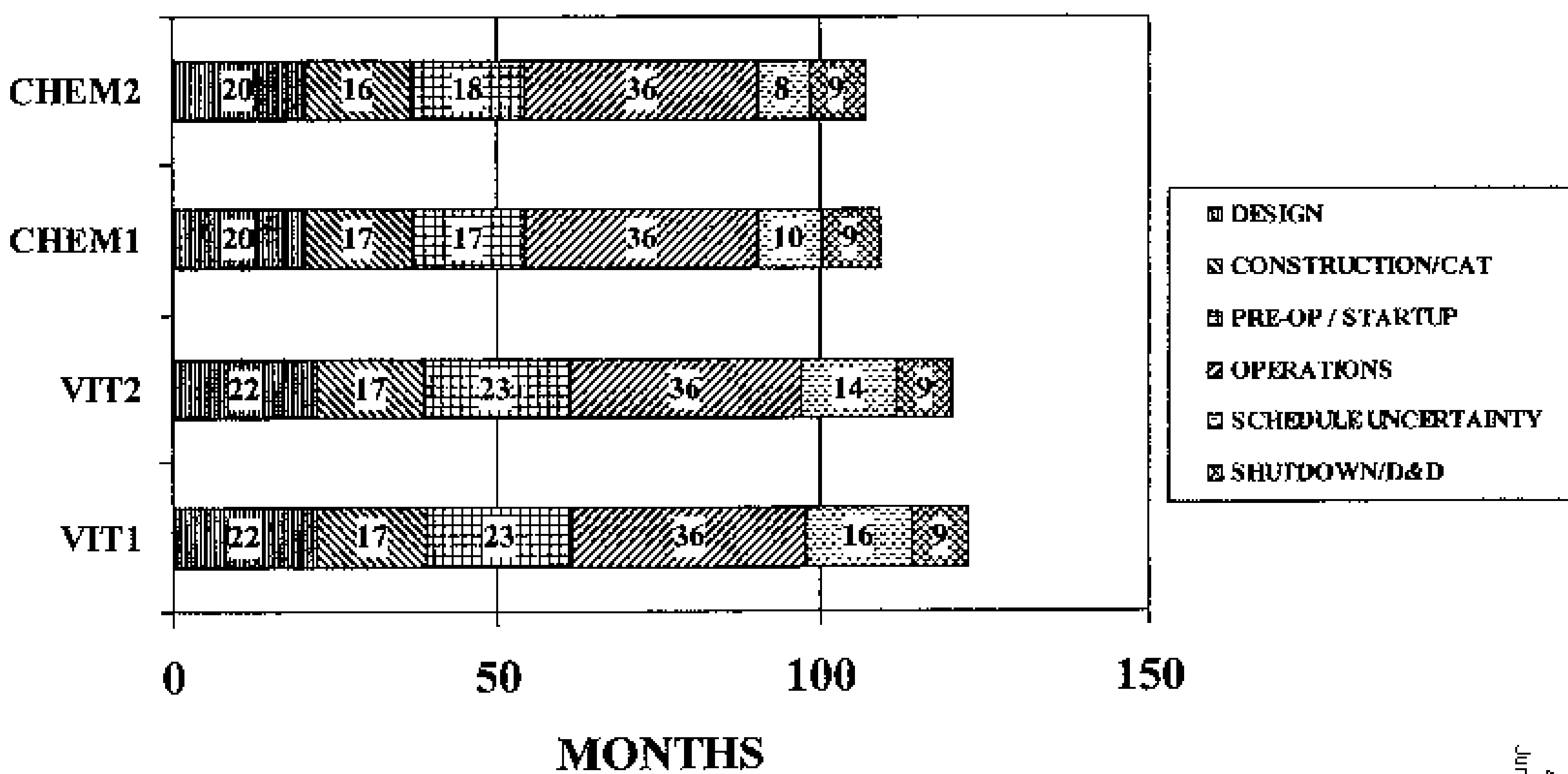
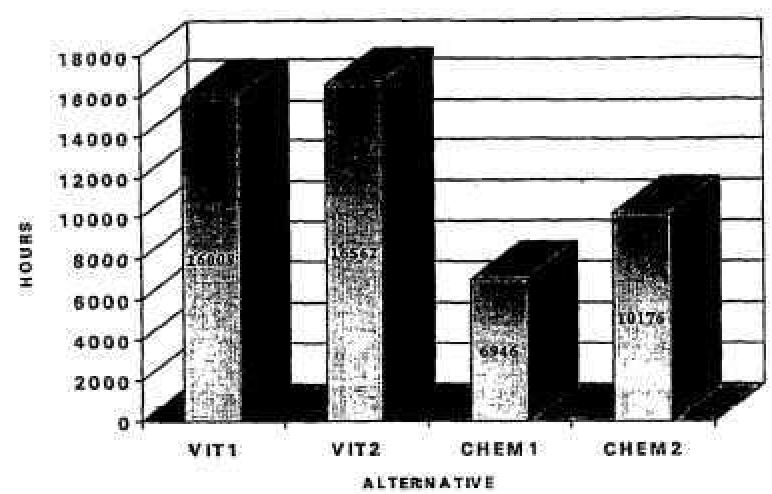


FIGURE 5.2-5
SUMMARY OF TOTAL REQUIRED OPERATING HOURS



5.2.2.4 Implementability

Overall, this criterion favors chemical stabilization due to a greater degree of commercial demonstration of the treatment technology, less complexity of integrated systems, and greater confidence in its ability to be successfully implemented.

Figure 5.2-6 summarizes the implementability analysis.

Both vitrification and chemical stabilization are difficult to implement because of the nature of the Silos 1 and 2 material, which requires remote operations. Although operational risks for both can be controlled, chemical stabilization is preferred because there is more demonstrated commercial experience with this technology. In addition, chemical stabilization is less complex than vitrification and therefore more certain in its ability to be successfully implemented; and, it offers greater opportunity for schedule acceleration and recovery in the event of unplanned downtime.

Both vitrification and chemical stabilization have encountered difficulties in treating radioactive wastes in the DOE-complex. However, there is significantly more demonstrated experience in the commercial sector on both radioactive, hazardous and mixed wastes with the chemical stabilization technology than with the vitrification technology. In addition, based on evaluation of existing facilities, the production rate required for the vitrification process to treat Silos 1 and 2 material within an acceptable timeframe is at the upper limit of the current capacities of existing vitrification facilities treating radioactive material. The production rate required for the chemical stabilization process is well within the limits of the capacity demonstrated by existing chemical stabilization facilities.

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FIGURE 5.2-6
IMPLEMENTABILITY SUMMARY TABLE

ITEM	VIT1/VIT2 Strongly Favors	VIT1/VIT2 Favors	Neutral	CHEM1/CHEM2 Favors	CHEM1/CHEM2 Strongly Favors
Technical Feasibility					
Scaleup			↓		
Commercial Demonstration				↓	
Operability					
Ease of Operation				↓	
Reliability				↓	
Maintainability				↓	
Complexity				↓	
Ease of Acceleration				↓	
Constructability (Ease of Construction/Fabrication, Ease of D&D)				↓	
Administrative Feasibility (Licensing and Programmatic)			↓		
Availability of Services (Contractors, Equipment and Utilities)			↓		

To treat Silos 1 and 2 material within a three-year time period (assumed as a common basis for the comparative analysis), the vitrification process would have to produce 15 tons of vitrified material per day. Within the experience of the vitrification technology, there are no facilities in the DOE-complex and only two facilities (vitrification-other facilities) in the commercial sector operating at the required capacity. This limited experience at the required capacity results in increased uncertainty as to whether the current technology has the capability to treat Silos 1 and 2 material at the required capacity. In comparison, to treat Silos 1 and 2 material within a three-year time period, the chemical stabilization process would have to process 12 cubic yards (yd^3) of Silos 1 and 2 material per day. There have been a number of chemical stabilization facilities in both the DOE-complex and the commercial sector that have operated at the required capacity. Because there is a greater degree of commercial demonstration of the chemical stabilization process at the required capacity, there is less uncertainty in its ability to treat Silos 1 and 2 at the required capacity.

Vitrification has more unit operations associated with it than chemical stabilization and is therefore considered to be more complex to operate and maintain than chemical stabilization. The integrated operation of complex systems associated with the vitrification process increases the likelihood of process upsets and resulting downtime. In addition, the complexity of process control associated with vitrification complicates melter operation. Included in the complexity of the process control are critical parameters that are not readily measured, such as viscosity, electrical conductivity, liquidus temperature, and sulfate formation. Furthermore, as stated under the discussion of short-term effectiveness, the hazards inherent to the vitrification process incrementally increase the risk to the workers during maintenance activities, and make recovery from upsets more difficult.

The two vitrification processes propose to operate 24 hr/day for 7 days/wk for three years. The two chemical stabilization processes propose to operate 16 to 24 hr/day for 5 days/wk for three years. Based on the current designs, the chemical stabilization process has a better opportunity to improve schedule and accelerate remediation. In addition, based on current designs, the chemical stabilization has a better opportunity to recover from process upsets or other downtime.

Based on the above evaluation, chemical stabilization is the preferred alternative to implement. Chemical stabilization has a greater degree of commercial demonstration at the required capacity, is less complex to operate, and provides more opportunity to recover from process upsets and other downtime, as well as more opportunity to improve schedule.

5.2.2.5 Cost

The cost evaluation is based on estimates that were developed on information from the four preconceptual designs presented in Appendix G of the revised FS and the technology-specific POP testing information presented in Appendix H of the revised FS using a variety of cost-estimating methods.

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The cost estimates were developed for (1) capital costs; (2) O&M costs; (3) waste shipping and disposal costs; (4) D&D costs; (5) engineering costs; (6) project management costs; and (7) cost of borrowing money. The cost estimates are prepared so as to estimate and evaluate each cost element identified in the preconceptual design. Therefore, the accuracy of the estimates is a function of the preconceptual designs. The accuracy of all four estimates is considered +50/-30%, which is consistent with CERCLA guidance (EPA 1988). Given the fact that potential contractors will be given the opportunity to propose their unique designs based on their commercial experience, the actual design may change significantly. The subject accuracy establishes a range that is likely to capture that which is ultimately bid in response to a request for proposal to remediate the Silos 1 and 2 material and baselined following this ROD Amendment. All estimates were developed in fiscal year 1999 (FY99) dollars so that the alternatives with costs incurred over differing time periods can be evaluated on an equivalent basis.

Table 5.2-2 and Figure 5.2-7 summarize the major cost elements for the four processes.

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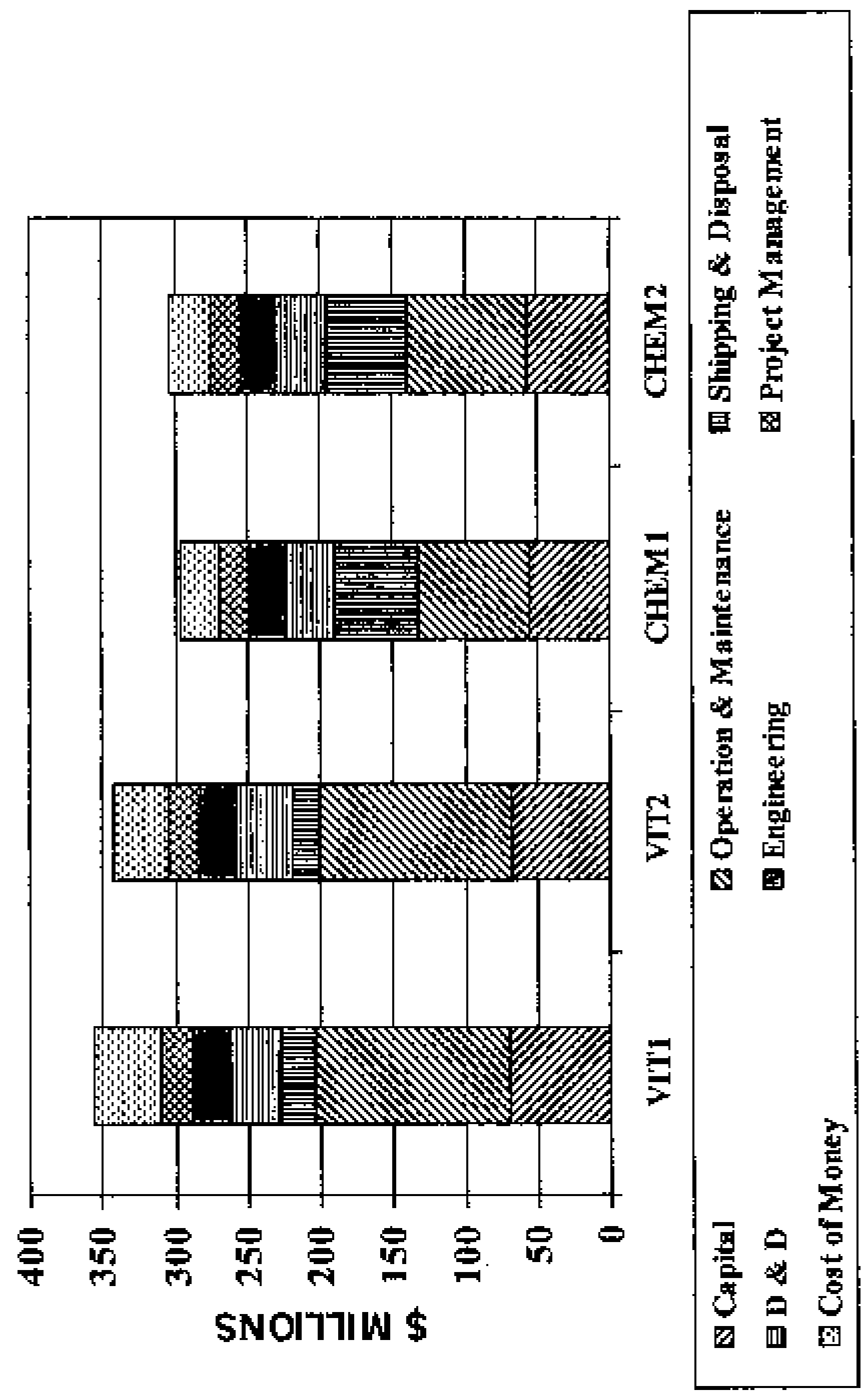
TABLE 5.2-2
FEASIBILITY STUDY SUMMARY COST DATA (ALL ALTERNATIVES)

Alternative	Vitrification		Chemical Stabilization	
Process Option	VIT1	VIT2	CHEM1	CHEM2
Capital Cost	$69	$67	$55	$56
O&M Cost	$134	$133	$77	$83
Waste Disposal Cost	$25	$20	$58	$55
D&D Cost	$35	$38	$34	$36
Engineering Cost	$25	$25	$24	$24
Project Management Cost	$22	$22	$21	$21
Cost of Money	$46	$37	$28	$28
Summary cost (un-escalated)	$356	$342	$297	$303

FIGURE 5.2-7
FEASIBILITY STUDY COST COMPARISON



All four process options are cost effective; the costs appear proportional to the overall protectiveness provided by the alternatives, both during and following the remediation period. The cost differential between the vitrification and chemical stabilization alternatives is approximately 16%, with the cost of chemical stabilization being lower. The following discussion identifies the differences between the four alternatives for the key cost elements.

Capital Cost

Vitrification has a higher estimated capital cost than chemical stabilization due to the complexity of the process equipment. The need for sizeable interim storage areas for chemical stabilization partially off-sets the higher equipment costs of the vitrification alternative.

Operations and Maintenance Cost

Vitrification has a higher estimated O&M cost than chemical stabilization for the following reasons:

! Vitrification operations are on a 24 hr/day, 7 days/wk schedule;

! Vitrification requires an additional 8-month proof of process testing (full-scale surrogate operations);

! Vitrification has more expensive spare parts (specialized). Melter refractory life is limited and may need to be replaced during the 3 years of operation; and

! Vitrification uses more costly consumables (chemicals, supplies) and uses (electricity, natural gas).

Waste Shipping and Disposal Cost

Chemical stabilization has higher estimated packaging, transportation, and disposal costs than vitrification. The lower waste loading (chemical stabilization) produces a greater volume of treated material resulting in an increased number of disposal containers, shipments, and disposal volume.

D&D Cost

The D&D costs are roughly equivalent for both alternatives. Vitrification has a higher D&D cost due to the more complicated plant layout (multiple floors, equipment). However, the difference is offset by the D&D cost of chemical stabilization having more building debris to handle due to the larger interim storage facility.

Engineering Cost

Vitrification has a slightly higher estimated engineering cost than chemical stabilization due to the complexity of the process design.

Project Management Cost

Vitrification has higher estimated project management costs than chemical stabilization due to the vitrification schedule being longer, with project management being level-of-effort based on the schedule duration.

Cost of Money

Based on the contracting strategy planned for the remediation of the Silos 1 and 2 material, the contractor must borrow money to finance the design and construction effort, well in advance of being reimbursed in accordance with a predetermined pay item schedule. Since vitrification has a higher upfront capital cost investment, vitrification has a higher cost of borrowing money than chemical stabilization.

6.0 SUPPORT AGENCY COMMENTS

6.1 State Acceptance

The State of Ohio concurs with the selected remedy and the ARARs put forth in this ROD Amendment for the remediation of the OU4 Silos 1 and 2 material. **Tables 6.1-1** presents the OEPA comments issued during the formal public comment period and DOE responses to the comments.

<END OF PAGE>

TABLE 6.1-1

OEPA COMMENTS ISSUED DURING FORMAL PUBLIC COMMENT PERIOD

Item	Page/Section	Comment	Response
1	General	The OU4 Silos 1 and 2 Proposed Plan is the culmination of efforts by U.S. DOE, Ohio EPA, and U.S. EPA to understand and develop a plan for treating and disposing of the K-65 silos and their contents. Ohio EPA believes the alternative selected in the Proposed Plan is protective of human health and the environment. Ohio EPA supports the preferred alternative of chemical stabilization for the K-65 wastes. The preferred alternative is more implementable and will result in substantially less secondary wastes. Of significant importance to Ohio EPA during considering the alternatives is the release of radon gas during treatment. Ohio EPA believes the preferred alternative provides a substantial reduction in air pollution releases and increased reliability of emissions controls over the other alternative considered.	The DOE acknowledges OEPA's support of chemical stabilization as the preferred technology for the treatment of the Silos 1 and 2 material.

TABLE 6.1-1 (CONTINUED)

Item	Page/Section	Comment	Response
2		DOE should commit to including and/or developing real-time monitoring for discharges to the environment resulting from remedial actions. DOE should attempt to incorporate any new developments in real-time monitoring from the DOE Office of Science & Technology as well as the private sector. Data obtained from real-time monitors and any additional monitoring activities should be provided to the Ohio EPA and public in a timely manner.	As part of the remedial design activities for the Silos 1 and 2 remedial actions, a preliminary and final safety assessment will be conducted by DOE to establish the safety basis and design objectives for the construction and the operation of all remedial facilities. The safety basis includes those measures (i.e., procedures, training, monitoring equipment) necessary to ensure that facilities will be constructed and operated in a safe manner and in compliance with ARARs.

TABLE 6.1-1 (continued)

Item	Page/Section	Comment	Response
2 (cont.)			It is the DOE policy in its conduct of operations to require facility operations procedures to be developed and adhered to during all remedial actions. Training of personnel to those procedures will be paramount to ensure safe conduct of all operations. DOE and Fluor Fernald, Inc. have developed and maintain the necessary emergency plans and procedures to adequately define the emergency management program, provide guidance for all emergency responders, proper notification of the public, ensure adequate monitoring and performance for critical systems, and to meet all regulatory requirements. Developing a plan for the use of “real-time” monitoring is an integral part of the remedial design which will be developed in partnership with EPA and OEPA. Results of “real-time” radon monitoring are currently available through the Integrated Environmental Monitoring Program and the Fernald Website (www.fernald.gov). As the project develops, the Silos 1 and 2 Project will define occupational monitoring requirements, including “real-time” monitoring. These results will also be made available to the affected workforce. DOE expects to work closely with the EPA and OEPA to establish monitoring programs responsive to the environmental, public health, and occupational concerns regarding remediation of Silos 1 and 2 material.

TABLE 6.1-1 (continued)

Item	Page/Section	Comment	Response
3	General	DOE should attempt to incorporate pollution prevention activities whenever possible during the design and operation of the Silos 1 and 2 remedial action systems, including using this as a criterion in selection of a contractor. All available methods to reduce or eliminate discharges and releases should be considered during the design of the system. The consideration of reducing decontamination and demolition volumes and cost should be part of the contractor selection and design activities.	It is DOE policy, in accordance with Executive Order 12856, whenever feasible to apply pollution prevention and waste minimization principles into the design and operation of all its facilities. Accordingly, the technical specification for the Request for Proposal to be issued for this project contains provisions for the future contractor to incorporate pollution prevention and waste minimization features during the design effort. One of the evaluation criteria to be used in selecting the future contractor is the degree to which his design exhibits minimization of primary and secondary wastestreams. As part of the CERCLA remedial design process, EPA and OEPA will have the opportunity to review and approve the Contractor's design.
4	General	DOE must ensure the public that their involvement will not be diminished during Remedial Design and Remedial Action (RD/RA). DOE should commit within the Record of Decision for OU4 Silos 1 and 2 to maintaining the exceptional on-going public involvement program during RD/RA.	The public has played a fundamental role in shaping the path forward for the Silos Project. DOE is committed to sustaining public involvement through completion of the Silos 1 and 2 RD/RA activities. The Record of Decision Amendment will reaffirm DOE's commitment to public involvement.

7.0 STATUTORY DETERMINATIONS

The NCP [40 CFR Section 300.430(f)(5)(ii)] specifies that a ROD shall describe the following statutory requirements as they relate to the scope and objectives of the action:

- How the selected remedy is protective of human health and the environment;
- How the remedy will comply with all ARARs established under federal and state environmental laws (or justify a waiver);
- How the remedy is cost-effective (i.e., provides overall effectiveness proportional to its costs);
- How the remedy will use permanent solutions and alternative technologies or recovery technologies to the maximum extent practicable; and
- How the remedy will satisfy the statutory preference for remedies that employ treatment that permanently and significantly reduces the toxicity, mobility, or volume of the hazardous substances, pollutants, or contaminants as a principle element, or if it is not satisfied, explain why a remedy providing reductions in toxicity, mobility, or volume was not selected.

In addition, CERCLA requires five year reviews to determine if adequate protection of human health and the environment is being maintained where RAs result in hazardous substances remaining on-site above health-based levels. A discussion is provided below on how the selected response actions for Silos 1 and 2 satisfy these statutory requirements.

7.1 Protection of Human Health and the Environment

The selected remedy achieves the requirement of being protective of human health and the environment by: (1) removing the sources of contamination, (2) treating and stabilizing the materials giving rise to the principle threats from Silos 1 and 2, (3) disposing of treated materials at an off-site location that provides the appropriate level of protectiveness; and, (4) remediating contaminated soils and debris to protective levels. The contents of Silos 1 and 2 and the Decant Sump Tank System will be removed and treated through a chemical stabilization process and disposed at the NTS. Chemical stabilization will immobilize these materials and inhibit leaching of contaminants to the environment when they are disposed. Concrete from Silos 1 and 2 structures will undergo gross decontamination, demolition, size reduction, and packaging before being shipped off-site for disposal at the NTS or an appropriate PCDF. Silos 3 and 4 concrete structures and other facilities (i.e., treatment facilities, RTS, superstructures) will be removed from OU4 and disposed of in a manner consistent with the approved OU3 ROD (FEMP 1996c). Contaminated soil will also be removed and disposed in a manner consistent with the approved OU5 ROD (FEMP 1996d).

Baseline cancer risks from current conditions exceed the 10^{-4} to 10^{-6} acceptable risk range. Under the future land use scenario of continued federal ownership, the residual cancer risk from Silos 1 and 2 will be reduced to less than 1×10^{-6}. There are no short-term threats associated with the selected remedy that cannot be readily controlled. In addition, no adverse cross-media impacts are expected from the remedy.

7.2 Compliance with Applicable or Relevant and Appropriate Requirements

In accordance with Part 121 of CERCLA, the selected remedy will achieve a standard or level of control consistent with all Federal and State of Ohio ARARs and TBCs. The selected remedy will also be performed in accordance with all pertinent DOE Orders. **Appendix A** provides a listing of the chemical-, action-, and location-specific ARARs and TBCs that are invoked by this remedy.

Removal, treatment by chemical stabilization, and shipment for off-site disposal of Silos 1 and 2 material will be conducted in accordance with ARARs identified in this ROD Amendment. Concrete debris from Silos 1 and 2 will be disposed off-site at the NTS or an appropriate PCDF. Disposition of rubble and debris from Silos 3 and 4 and associated facilities (i.e., superstructures, treatment facilities, and the RTS) will be performed in accordance with the OSDF WAC, and will be conducted in accordance with the ARARs identified in the OU3 ROD. Disposition of soils from Silos 1 and 2 will be conducted in accordance with ARARs established in the OU5 ROD. Any interim storage of rubble and debris or soils, prior to final disposition under the RODs for OU3 and OU5, respectively, will be in accordance with ARARs identified in this ROD Amendment, pertinent DOE Orders, and applicable site procedures.

Silos 1 and 2 material destined for remediation is by-product material as defined under Section 11 (e)(2) of the Atomic Energy Act of 1954, and as such, is excluded from RCRA regulation [40 CFR Section 261.4(a)(4)]. By-product material, as defined by the AEA, includes tailings or wastes produced by the extraction or concentration of uranium and thorium from any ore processed primarily for its source material content (42 U.S.C. 2014).

Since the Silos 1 and 2 material is excluded from regulation as solid or hazardous waste, the requirements under RCRA are not applicable to Silos 1 and 2 RAs. However, based on analytical data, the material is sufficiently similar to RCRA hazardous waste because Silos 1 and 2 material exceeds toxicity characteristic levels for various toxicity characteristic metals under RCRA. Therefore, certain substantive requirements of RCRA are relevant and appropriate for management of the Silos 1 and 2 material, and are included in the table of ARARs in **Appendix A.** The selected remedy will meet all relevant appropriate RCRA requirements.

7.3 Cost Effectiveness

The selected remedial alternative has been determined to be protective of human health and the environment, and to be cost effective. The estimated project cost for this remedy is approximately three-hundred (300) million dollars.

7.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The EPA and the State of Ohio have determined that the selected remedy for Silos 1 and 2 represents the maximum extent to which permanent solutions and treatment technologies can be used in a cost-effective manner. Of the alternatives that are protective of human health and the environment and comply with ARARs, the EPA and the State of Ohio have determined that this selected remedy provides the best balance of tradeoffs among the alternatives in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, and cost. The selected remedy also meets the statutory preference for treatment as a principle element.

Chemical stabilization and off-site disposal will provide permanent treatment for the Silos 1 and 2 material. By chemically binding the contaminants into a chemical stabilization matrix, the mobility of the contaminants significantly reduces the leachability of metal contaminants of concern to levels that are below RCRA regulatory thresholds. As a result, the selected remedy would meet the CERCLA criteria for permanent solutions that reduce the toxicity, mobility, or volume through treatment.

7.5 Preference for Treatment as a Principal Element

The statutory preference for remedies that employ treatment as a principal element is satisfied. By treating the contents of Silos 1 and 2 in a chemical stabilization process, and providing for management, including treatment and disposal, of contaminated debris and soils consistent with the OU3 and OU5 RODs, the selected remedy mitigates the principal threats posed by OU4 through the use of treatment technologies. The treatment provided by chemical stabilization accomplishes a significant, permanent reduction in mobility of the COCs.

7.6 Irreversible and Irretrievable Commitment of Resources

Implementing the selected remedy will result in permanent commitment of on-property land and associated natural resource services for material disposal at the FEMP site and off-site at the NTS.

Soil at the FEMP site and the NTS will be disturbed by construction and excavation activities. Many impacts will be temporary, pending completion of remedial activities and restoration programs. The implementation of the selected remedy will temporarily disturb approximately 13,747 m^3 (17,981 yd^3) to 13,958 m^3 (18,257 yd^3) of soil at the FEMP site. All areas disturbed at the FEMP site will be regraded and revegetated.

Soil at the NTS will be permanently disturbed for the disposal of chemical stabilized Silos 1 and 2 material. However, disturbance of soil will be in an area previously designated by the NTS for low-level radioactive waste disposal (Area 5 Radioactive Waste Management Site) as evaluated in the NTS-EIS.

The area of the FEMP designated for Silos 1 and 2 remedial activities has already been industrialized, and does not provide a critical habitat for threatened or endangered species. Therefore, the short-term disturbance of land under the selected remedy is not anticipated to impact biotic resources. The desert tortoise is the only threatened or endangered species at the NTS. DOE-NV has evaluated the effects of the programs of the NTS-EIS on the desert tortoise. Because disposal of chemical stabilized Silos 1 and 2 material will be in an area previously designated for low-level radioactive waste disposal (Area #5), disturbance of land at the NTS is not expected to impact biotic resources.

The selected remedy is not anticipated to adversely impact wetlands and associated natural resource services. Long-term direct impacts to the floodplain resulting in changes of flood elevations will not occur. Engineering controls would be implemented to minimize or eliminate any indirect impacts. The NTS does not have any designated wetland areas or floodplain areas.

The implementation of this alternative is expected to have minor impacts on the surface water hydrology at the NTS. The NTS lies in an arid region with little rainfall; continuously flowing streams are nonexistent at the NTS.

Through erosion control and dust suppression, transport to adjacent surface water bodies of contaminants disturbed during remediation at the FEMP is not expected. Surface water near the site would be monitored during remediation in accordance with the existing National Pollution Discharge Elimination System permit to assess potential impacts to the water from remediation. Because material would always be contained, remediation activities would not be expected to increase the release of contaminants to the groundwater.

It is assumed that resources for remedial work will be purchased within the consolidated metropolitan statistical area (CMSA), resulting in a minor beneficial impact to the CMSA in the short-term. Furthermore, the removal of the Silos 1 and 2 material reduces impacts to population and economic growth in the area.

Since 1951, primary land use on the NTS has been nuclear weapons testing and low-level radioactive waste disposal for on-site and off-site DOE-affiliated generators. The NTS is surrounded on the east, north, and west sides by public access exclusion zones (e.g. Nellis Air Force Base Bombing and Gunnery Range). This area provides a buffer zone between the test areas and public lands of 24 to 105 kilometers (15 to 65 miles). The off-site areas adjacent to the NTS are predominantly rural; hence, aesthetic impacts are not expected to change. Therefore, disposal activities associated with the selected remedy do not impact socioeconomics or land use at the NTS.

8.0 COMMUNITY PARTICIPATION

8.1 Community Acceptance

Community acceptance is one of the criteria that DOE and EPA are committed to considering during the decision-making process for selecting a remedy for the Silos 1 and 2 material. The NCP specifies that the public must be provided the opportunity for input in selection of RAs. Specifically, the NCP [40 CFR Section 300.435(c)(2)(ii)] specifies that proposed amendments to the ROD and information supporting the decision be made available for public comment. This interaction with the community is critical to the CERCLA process and to making sound environmental decisions.

To augment public involvement throughout the decision-making process, the DOE-FEMP chartered the Critical Analysis Team (CAT). The CAT, which is comprised of three independent technical and process oriented leaders, is focused on evaluating the technical basis and objectivity of the development and evaluation of the remedial alternatives. Through their development, the revised Silos 1 and 2 FS, the PP, and this ROD Amendment, have considered input of the CAT. The CAT has provided independent feedback to the public on its technical evaluation of the documentation supporting this ROD Amendment (FS, PP, POP test reports).

During the decision-making process documented in this ROD Amendment, DOE has actively informed and solicited feedback from stakeholders. The DOE has sponsored several community briefings and workshops both locally and at the NTS to share the data supporting the evaluation of alternatives in the revised FS and PP. In addition, the DOE has sponsored formal public hearings regarding the PP both locally and at the NTS in an effort to provide the public a forum to provide verbal comments on the preferred alternative identified in the PP. **Table 8.1-1** presents a summary of these public involvement opportunities.

TABLE 8.1-1

SUMMARY OF PUBLIC INVOLVEMENT OPPORTUNITIES

Meeting Topic	Location/Date
Preliminary Screening of Alternatives	FEMP/December 1997
Presentation of Proof of Principle testing data	FEMP/July 13, 1999
Summary of Detailed Analysis of Silos 1 and 2 FS	FEMP/October 12, 1999
Fernald Citizens Advisory Board (FCAB)	FEMP/October 14, 1999
FS overview with FCAB	FEMP/November 4 and 6, 1999
Summary of Comparative Analysis of Silos 1 and 2 FS	FEMP/November 17, 1999
Nevada Test Site Citizens Advisory Board Summary of Silos 1 and 2 FS Comparative Analysis	Las Vegas, Nevada/December 1, 1999
FCAB Proposed Plan Summary	FEMP/December 6, 1999
Formal Public Hearing on Silos 1 and 2 PP	FEMP/April 25, 2000
Formal Public Hearing on Silos 1 and 2 PP	Las Vegas, Nevada/May 3, 2000

The DOE and EPA have considered all public comments on the preferred alternative identified in the PP in preparing this ROD Amendment. All written and verbal comments received during the public comment period have been summarized and responded to in the *Responsiveness Summary* section of this ROD Amendment **(Appendix B).**

8.2 Community Participation

The community is encouraged to read and provide comments on the ROD Amendment for Silos 1 and 2. This ROD Amendment puts forth a selected RA alternative for the Silos 1 and 2 material based upon the content and conclusions of the FS and PP, as well as input provided by the EPA, OEPA, and stakeholders.

The revised FS for Silos 1 and 2, PP, ROD Amendment, and other supporting documents are available from the Administrative Record, located at the PEIC and at the EPA offices in Chicago, Illinois. Addresses for these Administrative Record locations are provided below.

The dates for the comment period have been announced in the local media and are posted at the Administrative Record locations; addresses and hours are as follows:

Public Environmental Information Center
10995 Hamilton-Cleves Highway
Harrison, Ohio 45030

513-648-7480

Monday, 7:30 a.m. to 8 p.m.
Tuesday – Thursday, 7:30 a.m. to 5 p.m.
Friday, 7:30 a.m. to 4:30 p.m.

U.S. EPA Region V
77 W. Jackson Blvd.
Chicago, Illinois 60604

312-886-0992

Monday – Friday, 8 a.m. to 5 p.m.

Your comments may be submitted by mail to:

Mr. Gary Stegner
U.S. Department of Energy
Fernald Area Office
P.O. Box 398705
Cincinnati, Ohio 45239-8705

513-648-3131

Mr. James A. Saric
U.S. EPA, 5HRE 8J
77 W. Jackson Blvd.
Chicago, Illinois 60604

312-886-0992

The OEPA is participating in the RI/FS and RA processes at the FEMP. For additional information concerning the state's role in the cleanup process at the FEMP or regarding the specifics of the revised FS and PP contact:

Tom Schneider
Ohio Environmental Protection Agency
401 E. Fifth Street
Dayton, Ohio 45402-2911

513-285-6466.

For additional information on public participation activities related to the revised Silos 1 and 2 FS, PP, or the FEMP site, visit the DOE-FEMP website at http://www.fernald.gov/.

8.3 Post-ROD Amendment Community Participation

Historically, the public has played a fundamental role in shaping the path forward for the Silos Project. DOE will sustain the same level of public involvement throughout the implementation of the Remedial Design/Remedial Action (RD/RA) activities, as was proven effective during the revised FS/PP and ROD Amendment process.

DOE is committed to maintaining public involvement through completion of the Silos 1 and 2 RD/RA activities. Per requirements under the NCP (40 CFR Section 300.435), DOE at a minimum will:

- Upon completion of the final engineering design, prepare a fact sheet describing the RD (40 CFR Section 300.435).

- Provide a public briefing upon completion of the final engineering design and prior to the beginning of the RA (40 CFR Section 300.435).

- Continue to provide project status through the Monthly Progress Briefings.

<END OF SECTION>

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[4] Documentation of Remedial Investigation/Feasibility Study activities for each operable unit is made available for public review. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Administrative Records for the FEMP site are located at the Public Environmental Information Center (PEIC) in Harrison, OH. 513-648-7480.

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<END OF SECTION>

APPENDIX A

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS/ TO BE CONSIDERED CRITERIA FOR MANAGEMENT OF THE SILOS 1 AND 2 MATERIAL

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
BMP	Best Management Practice
CAA	Clean Air Act
CFR	Code of Federal Regulations
COC	constituent of concern
CWA	Clean Water Act
DCG	derived concentration guide
DOE	U.S. Department of Energy
EDE	effective dose equivalent
FEMP	Fernald Environmental Management Project
mrem	milliroentgen per equivalent man
NEPA	National Environmental Policy Act
NPDES	National Pollution Discharge Elimination System
NTS	Nevada Test Site
NWP	Nationwide Permit
OAC	Ohio Administrative Code
ORC	Ohio Revised Code
OU	operable unit
pCi/L	picoCuries per liter
RCRA	Resource Conservation and Recovery Act, as amended
ROD	Record of Decision
TBC	to be considered
TSD	treatment, storage, and disposal
µCi/L	microcurie per liter
WAC	waste acceptance criteria

OVERVIEW

Appendix A presents a summary of applicable or relevant and appropriate requirements/to be considered criteria (ARARs/TBCs) associated with the remedial action selected for Silos 1 and 2 material. These tables group the ARARs/TBCs according to type (i.e., Chemical-specific, Location-specific, and Action-specific) and by governing regulatory act [e.g., Clean Air Act (CAA), Clean Water Act (CWA), Resource Conservation and Recovery Act, as amended (RCRA), etc.). The tables identify the regulatory requirement, a brief description of the requirement, and the classification of the ARAR/TBC.

Removal, treatment by chemical stabilization, and shipment for off-site disposal of Silos 1 and 2 material will be conducted in accordance with the ARARs identified in this Record of Decision (ROD) Amendment. Concrete debris from Silos 1 and 2 will undergo gross decontamination, demolition, size reduction, and packaging prior to shipment off-site for disposal at the Nevada Test Site (NTS) or an appropriately licensed commercial disposal facility. Disposition of rubble and debris from Silos 3 and 4 and associated facilities (i.e., superstructures, treatment facilities, and the Radon Treatment System) will be performed in accordance with the On-site Disposal Facility Waste Acceptance Criteria (WAC), and will be conducted in accordance with the ARARs identified in the Operable Unit 3 (OU3) ROD. Disposition of soils from Silos 1 and 2 will be conducted in accordance with ARARs established in the Operable Unit 5 (OU5) ROD. Any interim storage of rubble and debris or soils, prior to final disposition under the RODs for OU3 and OU5, respectively, will be in accordance with ARARs identified in this ROD Amendment, pertinent Department of Energy (DOE) Orders, and applicable site procedures.

TABLE A-1

SUMMARY OF ARARS FOR SILOS 1 AND 2 MATERIAL REMEDIAL ACTION ALTERNATIVES, CHEMICAL-SPECIFIC

Medium	CAA	Requirement	ARAR/TBC	Rationale for Implementation
Air	Radionuclide Emissions (Except Airborne Radon-222), 40 Code of Federal Regulations (CFR) Part 61 Subpart H.	Emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that might cause any member of the public to receive, in any year, define an effective dose equivalent (EDE) of 10 milliroentgen equivalent man (mrem) or greater per year. Monitoring is required at release points having potential to discharge radionuclides that could cause an EDE in excess of 1% of the standard (0.1 mrem/yr) to any member of the public.	Applicable	Radioactive materials within Silos 1 and 2 might contribute to the dosage to members of the public from the air pathway during implementation of remedial actions since the National Emissions Standards for Hazardous Air Pollutants applies to operating units.
Air	Radon-222 Emissions, 40 CFR Part 61 Subpart Q.	No source at a DOE facility shall emit more than 20 picoCuries per square meter - second of radon-222 as an average for the entire source during periods of storage and disposal.	Applicable	Facilities such as Silos 1 and 2 qualify as sources since they contain radium-226 in sufficient concentrations to emit radon-222. This requirement is applicable only to storage and disposal of radium-bearing by-product material.
Medium	DOE	Requirement	ARAR/TBC	Rationale for Implementation
Air	Residual Radioactive Material, Proposed 10 CFR Part 834	<u>Interim Storage</u> The above-background concentration of radon-222 in air above an interim storage facility must not exceed: 100 picoCuries per liter (pCi/L) at any point, an annual average of 30 pCi/L over the facility, or an annual average of 0.5 pCi/L at or above any location outside the site.	To be considered	Management of radium and thorium bearing waste might result in the release of radon gas to the environment.

TABLE A-1 (continued)

<table>
<tr><th>Medium</th><th>DOE (continued)</th><th>Requirement</th><th>ARAR/TBC</th><th>Rationale for Implementation</th></tr>
<tr><td>Air</td><td>Radiation Protection of the Public and the Environment, Proposed 10 CFR Part 834.</td><td>Residual concentrations of radionuclides in the air within uncontrolled areas are limited to those listed below (for known mixtures of radionuclides, the sum of the ratios of the observed concentration of each radionuclide to its corresponding limit must not exceed 1.0.).

Derived Concentration Guide
<table>
<tr><th></th><th colspan="3">microCuries per milliliter (µCi/mL)</th></tr>
<tr><th>Isotope</th><th>D[a]</th><th>W</th><th>Y</th></tr>
<tr><td>Actinium-227</td><td>2×10^{-15}</td><td>7×10^{-15}</td><td>1×10^{-14}</td></tr>
<tr><td>Lead-210</td><td>9×10^{-13}</td><td>------ [b]</td><td>------</td></tr>
<tr><td>Polonium-210</td><td>1×10^{-12}</td><td>1×10^{-12}</td><td>------</td></tr>
<tr><td>Protactinium-231</td><td>------</td><td>9×10^{-15}</td><td>1×10^{-14}</td></tr>
<tr><td>Radium-224</td><td>------</td><td>4×10^{-12}</td><td>------</td></tr>
<tr><td>Radium-226</td><td>------</td><td>1×10^{-12}</td><td>------</td></tr>
<tr><td>Radium-228</td><td>------</td><td>3×10^{-12}</td><td>------</td></tr>
<tr><td>Technetium-99</td><td>1×10^{-8}</td><td>2×10^{-9}</td><td>------</td></tr>
<tr><td>Strontium-90[c]</td><td>5×10^{-11}</td><td>------</td><td>9×10^{-12}</td></tr>
<tr><td>Thorium-228</td><td>------</td><td>5×10^{-14}</td><td>4 x 10-14</td></tr>
<tr><td>Thorium-230</td><td>------</td><td>4×10^{-14}</td><td>5×10^{-14}</td></tr>
<tr><td>Thorium-232</td><td>------</td><td>7×10^{-15}</td><td>1×10^{-14}</td></tr>
<tr><td>Uranium-234</td><td>4×10^{-12}</td><td>2×10^{-12}</td><td>9×10^{-14}</td></tr>
<tr><td>Uranium-235</td><td>5×10^{-12}</td><td>2×10^{-12}</td><td>1×10^{-13}</td></tr>
<tr><td>Uranium-236</td><td>5×10^{-12}</td><td>2×10^{-12}</td><td>1×10^{-13}</td></tr>
<tr><td>Uranium-238</td><td>5×10^{-12}</td><td>2×10^{-12}</td><td>1×10^{-14}</td></tr>
</table>
[a] D, W, and Y (days, weeks, years) represent lung retention classes; removal halftimes assigned to the compounds with classes D, W, and Y are 0.5, 50, and 500 days, respectively. Exposure conditions assume an inhalation rate of 8,400 cubic meters of air per year (based on an exposure over 24 hours per day, 365 days per year).

[b] A dashed line means that no limit has been established.

[c] The value shown for daily derived concentration guide (DCG) is for strontium radionuclides with a f_1 value of 3×10^{-1}. The value shown for yearly DCG is for strontium radionuclides for a f_1 value of 1×10^{-2}.</td><td>To be considered</td><td>Remediation of the Silos 1 and 2 material has the potential to release radionuclides.</td></tr>
</table>

TABLE A-1 (continued)

Medium	DOE (continued)	Requirement	ARAR/TBC	Rationale for Implementation
Water	Radiation Protection of the Public and the Environment, Proposed 10 CFR Part 834.	Residual concentrations of radionuclides in water that may be ingested are listed below. These DCGs for the constituents of concern (COCs) are based on a committed EDE of mrem/yr, assuming ingestion of 2 liters/day. Note that these DCGs apply only if ingestion is the single pathway of exposure. Ingested Water DCGs Isotope — (µCi/mL) Actinium-227 — $1x10^{-8}$ Lead-210 — $3x10^{-8}$ Polonium-210 — $8x10^{-8}$ Protactinium-231 — $1x10^{-8}$ Radium-224 — $4x10^{-7}$ Radium-226 — $1x10^{-7}$ Radium-228 — $1x10^{-7}$ Technetium-99 — $1x10^{-4}$ Strontium-90 — $1x10^{-6}$ Thorium-228 — $4x10^{-7}$ Thorium-230 — $3x10^{-7}$ Thorium-232 — $5x10^{-8}$ Uranium-234 — $5x10^{-7}$ Uranium-235 — $6x10^{-7}$ Uranium-236 — $5x10^{-7}$ Uranium-238 — $6x10^{-7}$	To be considered	Remediation of the Silos 1 and 2 material has the potential to release radionuclides.

TABLE A-1 (continued)

Medium	CWA	Requirement	ARAR/TBC	Rationale for Implementation
Water	Ohio Water Quality Standards, Ohio Administrative Code (OAC) 3745-1-04.	"Five Freedoms" for surface water: Surface waters of the state shall be free from: • objectionable suspended solids; • floating debris, oil and scum; • materials that create a nuisance; • toxic, harmful or lethal substances; and • nutrients that create nuisance growth	Relevant and Appropriate	Pertains to discharges to surface waters as a result of remediation and to on-site surface waters affected by site conditions.
Water	Ohio Water Quality Standards, OAC 3745-1-07.	Use Designations and Criteria All pollutants or combinations of pollutants shall not exceed, outside the mixing zone, the Numerical and Narrative Criteria for Aquatic Life Habitat and Water Supply Use Designations listed in Tables 7-1 through 7-15 of this rule. The following COCs for OU4 have warm water habitat criteria concentrations outside the mixing zone as follows: Constituent / Average conc.[a] micrograms per liter (ug/L) / 30-day Criteria conc. (ug/L) antimony / 650 / 190 arsenic / 360 / 190 beryllium / Tab. 7-10[b] / Tab. 7-11[c] cadmium / Tab. 7-10 / Tab. 7-11 chromium / Tab. 7-10 / Tab. 7-11 copper / Tab. 7-10 / Tab. 7-11 cyanide / 46 / 12 lead / Tab. 7-10 / Tab. 7-11 mercury / 1.1 / 0.20 nickel / Tab. 7-10 / Tab. 7-11 selenium / 20 / 5.0 silver / Tab. 7-10 / 1.3 thallium / 71 / 16	Applicable	Paddys run and the stream segment of the Great Miami River adjacent to the Fernald Environmental Management Project (FEMP) are designated as warm water aquatic life habitats with use designations of agricultural and industrial water supply, and primary contact recreation. Chemical contaminants within Silos 1 and 2 might be released during remediation such that they might contribute to contamination in these aquatic habitats. OAC 3745-1-21 (Water Use Designation for the Great Miami River) establishes the classification of the receiving waters for the FEMP.

TABLE A-1 (continued)

Medium	CWA	Requirement			ARAR/TBC	Rationale for Implementation
Water	Ohio Water Quality Standards, OAC 3745-1-07 (continued).	Constituent	average conc.[a] (ug/1)	30-day Criteria conc. (ug/1)		
		zinc	Tab. 7-10	Tab. 7-11		
		2-butanone	160000	7100		
		4-nitrophenol	790	35		
		acetone	550000	78000		
		aldrin	----	0.01		
		bis(2-ethylhexyl)phthalate	1100	8.4		
		carbon tetrachloride	1800	280		
		DDT	----	0.001		
		Dieldrin	----	0.005		
		di-n-butyl-phthalate	350	190		
		diethylphthalate	2600	120		
		dimethylphthalate	1700	73		
		endosulfan[d]	----	0.003		
		endrin	----	0.002		
		fluoranthene	200	8.9		
		methylene chloride	9700	430		
		PCBs	----	0.001		
		Phenol	5300	370		
		Tetrachloroethene	540	73		
		Toluene	2400	1700		
		[a] Criteria concentration shall be met outside mixing zone. [b] Criteria concentration based on hardness of water. See Table 7-10 for calculation to determine maximum concentration outside the mixing zone. [c] 30-day average criteria based on hardness of water. See Table 7-11 for calculation to determine allowable 30-day average concentration outside the mixing zone. [d] No designation was made as to whether endosulfan referred to endosulfan I or endosulfan II or the sum total of each. The remaining COCs for OU4 will have criteria concentration levels based on calculated acute aquatic criteria or chronic aquatic criteria.				

TABLE A-2

SUMMARY OF ARARS FOR SILOS 1 AND 2 MATERIAL REMEDIAL ACTION ALTERNATIVES, LOCATION-SPECIFIC

National Environmental Protection Act (NEPA)/U.S. Environmental Protection Agency	Requirement	ARAR/TBC	Rationale for Implementation
Endangered Species Protection, 50 CFR Part 402 [Ohio Revised Code (ORC) 1518, 1513.25 and OAC 1501-18-1-01].	Federal agencies must not jeopardize the continued existence of any endangered or threatened species, or destroy or adversely modify critical habitat of such species.	Relevant and Appropriate	Although the FEMP is located within the range of the Indiana bat, a federally listed endangered species, no sighting has occurred on the FEMP. Therefore, this requirement is relevant and appropriate. Any potential impacts of the remedial actions on this species must be evaluated and appropriate action taken.
NEPA/DOE	Requirement	ARAR/TBC	Rationale for Implementation
Compliance with Floodplain/Wetlands Environmental Review Requirements, 10 CFR Part 1022 (Executive Order 11990).	DOE actions in a wetland must first evaluate the potential adverse effects that those actions might have on the wetland and consider the natural and beneficial values served by the wetlands.	Applicable	This requirement is applicable because the FEMP is a DOE facility. Several alternatives might result in destruction or modification of wetland areas.

TABLE A-3

SUMMARY OF ARARS FOR SILOS 1 AND 2
REMEDIAL ACTION ALTERNATIVES, ACTION-SPECIFIC

Atomic Energy Act/DOE	Requirement	ARAR/TBC	Rationale for Implementation
10 CFR Part 1021	DOE actions must be subjected to NEPA evaluation as outlined by the Council on Environmental Quality regulations in 40 CFR Part 1500-1508	Applicable	This requirement is applicable because the FEMP is a DOE facility, and this requirement requires NEPA evaluation for specific actions at DOE facilities.
CWA	Requirement	ARAR/TBC	Rationale for Implementation
Nationwide Permit Program, 33 CFR Part 330.	The U.S. Corps of Engineers can issue a Nationwide Permit (NWP) as a general permit for certain classes of actions that involve dredge or fill activities in wetlands or navigable waters. Discharges of dredged or fill material into wetlands may require a wetland delineation.	Applicable	Remediation activities may require construction of access roads and utility lines resulting in minor wetland disturbances. Dredge and fill activities related to construction of these access roads and utility lines will be conducted in accordance with the substantive terms and conditions of NWP 14 (Road Crossing), and NWP 12 (Utility Line Backfill and Bedding). Ohio Environmental Protection Agency as been granted Section 401 State Water Quality Certification for NWPs 12 and 14.
Discharge of Stormwater Runoff, 40 CFR Section 122.26 (OAC 3745-38).	Stormwater runoff from landfills, construction sites, and industrial activities must be monitored and controlled. A Stormwater Pollution Prevention Plan is required for construction activities that result in a total land disturbance of five or more acres.	Applicable	Required of industrial waste sites and construction sites of greater than five acres that discharge stormwater runoff to the waters of the U.S. Some remedial alternatives evaluated might disturb more than five acres of land.

TABLE A-3 (continued)

CWA (continued)	Requirement	ARAR/TBC	Rationale for Implementation
Discharge of Treatment System Effluent, 40 CFR Section 125.100. 40 CFR Section 125.104.	<u>Best Management Practices (BMPs)</u> Development and implementation of a BMP program to prevent the release of toxic or hazardous pollutants to waters of the U.S. Development and implementation of a sitewide BMP Program is also required as a condition of the FEMP National Pollution Discharge Elimination System (NPDES) Permit. The BMP program must: • Establish specific objectives for the control of toxic and hazardous pollutants, and • Include a predication of direction, rate of flow, and total quantity of toxic and hazardous pollutants where experience indicates a reasonable potential for equipment failure.	Relevant and Appropriate	All of the proposed actions have the potential for releases and runoff from this OU. This requirement is not applicable because BMP under the NPDES permit program applies only to ancillary facilities of manufacturing units that might have releases of toxic or hazardous pollutants. The purpose of the BMP program is relevant and appropriate to prevent releases from spills or runoff during the implementation of remedial actions. The FEMP has an approved BMP Plan.
Safe Drinking Water Act	**Requirement**	**ARAR/TBC**	**Rationale for Implementation**
Ohio Water Well Standards, OAC 3745-9-10.	<u>Abandonment of Test Holes and Wells</u> Upon completion of testing, a test hole or well shall be either completely filled with grout or such material as will prevent contaminants from entering groundwater.	Applicable	Test borings and wells might be installed and/or closed as part of these remedial alternatives.

TABLE A-3 (continued)

Uranium Mill Tailings Radiation Control Act	Requirement	ARAR/TBC	Rationale for Implementation
Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-level and Transuranic Radioactive Wastes, 40 CFR Section 191.03 (b)	Establishes standard for management and storage of spent nuclear fuel, high-level and transuranic waste to ensure the combined annual dose does not exceed specified limits.	Relevant and Appropriate	Radiation levels associated with Silos 1 and 2 material are similar to those associated with waste regulated by this requirement. On-site activities will have necessary controls in place to ensure protection of public.
Implementation of Health and Environmental Protection Standards for Uranium Mill Tailings, 40 CFR Part 192 Subpart C.	This subpart contains guidance, criteria, and supplemental standards for compliance with Subparts A and B of 40 CFR Part 192.	Relevant and Appropriate	Radioactive materials in this OU are primarily by-product residues from uranium processing. Requirements for design of controls should be consistent with design of controls for other residual radioactive materials such as mill tailings.

TABLE A-3 (continued)

RCRA Subtitle C	Requirement	ARAR/TBC	Rationale for Implementation
Hazardous Waste Determinations, 40 CFR Section 262.11 (OAC 3745-52-11).	Any generator of waste must determine whether or not the waste is hazardous. The procedures for determination include: ! Identification of whether a particular material of concern is a "solid waste"; ! Identification of whether a particular exclusion applies to the material eliminating it from definition as a "solid waste"; ! Identification of whether a particular solid waste might be classified as a hazardous waste; and ! Determination of whether a material otherwise classified as a "hazardous waste" might be excluded from RCRA regulation.	Relevant and Appropriate (This requirement will be applicable to non-excluded solid wastes that exhibit a hazardous characteristic.)	These procedures are established to determine whether wastes are subject to the requirements of RCRA. The materials in Silos 1 and 2 are specifically exempt from the applicability of RCRA requirements. However, these procedures are relevant and appropriate to determine whether OU4 wastes, whether excluded or not, exhibit the characteristics of hazardous waste, or are otherwise similar to RCRA hazardous waste. The material stored in the silos are sufficiently similar to hazardous wastes based on the toxicity characteristic leaching procedure results. Silos 1 and 2 contain materials that must be treated, stored, and disposed in accordance with RCRA. Other wastes, such as debris generated during decontamination (e.g., concrete scabbling), will also require a hazardous waste determination.

TABLE A-3 (continued)

RCRA Subtitle C	Requirement	ARAR/TBC	Rationale for Implementation
Empty Containers, 40 CFR Section 261.7 (OAC 3745-51-7).	Containers that have held hazardous wastes are “empty” and exempt from further RCRA regulations if one or more of the following are met: ! No more than 2.5 cm (1 inch) of residue remains on the bottom of their inner liner; ! Less than 3% by weight of total capacity remains (less than or equal to 110 gallon container); and ! Less than 0.3% by weight of total capacity remains (greater than 110 gallon container). Containers that have held acutely hazardous (“P” listed) wastes are “empty” and exempt from further RCRA regulation if: ! They or their inner liners have been triple rinsed with an adequate solvent or the inner liner has been removed from the container.	Relevant and Appropriate (This requirement will be applicable to non-excluded solid wastes that exhibit a hazardous characteristic.)	Containers used to treat or store the contents of Silos 1 and 2 might contain residues that exhibit hazardous waste characteristics which must be removed before the containers might be reused or disposed.
Generators Who Transport Hazardous Waste for Off-site Treatment, Storage, or Disposal; 40 CFR Sections 262.20 - 33 and 263.20 - 31 (OAC 3745-52-20 through 33 and OAC 3745-53-20 through 31).	Any generator who transports hazardous waste for off-site treatment, storage or disposal must originate and follow-up the manifest for off- site shipments.	Applicable	Any residues determined to be RCRA hazardous waste removed from this OU for off-site treatment, storage, or disposal might be subject to the manifest requirements.

TABLE A-3 (continued)

RCRA Subtitle C (continued)	Requirement	ARAR/TBC	Rationale for Implementation
Treatment, Storage, or Disposal Facility Standards; 40 CFR Part 264 Subpart B (OAC 3745-54-13 through 16).	General Standards ! Waste Analysis - OAC 3745-54-13: Operators of a facility must obtain a detailed chemical and physical analysis of a representative sample of each hazardous waste to be treated, stored, or disposed of at the facility prior to treatment, storage, or disposal. ! Security - OAC 3745-54-14: Operators of a facility must prevent the unknowing or unauthorized entry of persons or livestock into the active portions of the facility, maintain a 24-hour surveillance system, or surround the facility with a controlled access barrier and maintain appropriate warning signs at facility approaches. ! Inspections - OAC 3745-54-15: Operators of a facility must: (1) develop a schedule and regularly inspect monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment that are important to preventing, detecting or responding to environmental or human health hazards; (2) promptly or immediately remedy defects; and (3) maintain an inspection log. ! Training - OAC 3745-54-16: Operators must train personnel, within six months of their assumption of duties at a facility, in hazardous waste management procedures relevant to their positions, including emergency response training.	Relevant and Appropriate (This requirement will be applicable to non-excluded solid waste that exhibit a hazardous characteristic.)	Residues that exhibit a characteristic similar to RCRA hazardous waste, removed from this OU, might be treated, stored, and disposed in accordance with treatment, storage, and disposal (TSD) facility standards. These requirements are relevant and appropriate because the residues are sufficiently similar to hazardous waste.

TABLE A-3 (continued)

RCRA Subtitle C (continued)	Requirement	ARAR/TBC	Rationale for Implementation
Treatment, Storage, of Disposal Facility Preparedness and Prevention; 40 CFR Part 264 Subpart C and 40 CFR Section 264.31 (OAC 3745-54-31).	TSD facility operators must design, construct, maintain and operate facilities to minimize the possibility of a fire, explosion, or any unplanned sudden or nonsudden release of hazardous waste to air, soil, or surface water which might threaten human health or the environment.	Relevant and Appropriate (This requirement will be applicable to non-excluded solid wastes that exhibit a hazardous characteristic.)	Residues removed from this OU might be treated, stored, and disposed in accordance with TSD facility standards. These requirements are relevant and appropriate because the residues are sufficiently similar to hazardous waste.
40 CFR Section 264.32 (OAC 3745-54-32).	Facilities must be equipped with an internal communication or alarm system, a telephone, or a two-way radio for calling outside to emergency assistance, fire control, and spill control. Decontamination equipment and water must be at an adequate volume and pressure to supply water hose streams, foam producing equipment, automatic sprinklers, or water spray systems.		
40 CFR Section 264.33 (OAC 3745-54-33).	Fire protection, spill-control and decontamination equipment, and communication and alarm systems must be tested and maintained, and necessary, to ensure proper emergency operation.		
40 CFR Section 264.34 (OAC 3745-54-34).	Personnel must have immediate access to emergency communication or alarm systems whenever hazardous waste is being handled at the facility.		
40 CFR Section 264.35 (OAC 3745-54-35).	Aisle space must be sufficient to allow unobstructed movement of personnel, fire and spill control, and decontamination equipment.		
40 CFR Section 264.37 (OAC 3745-54-37).	Operators must attempt to make arrangements, appropriate to the waste handled, for emergency response by local and state fire, police and medical personnel.		

TABLE A-3 (continued)

RCRA Subtitle C (continued)	Requirement	ARAR/TBC	Rationale for Implementation
Treatment, Storage, or Disposal Facility Contingency Plan and Emergency Procedures; 40 CFR Part 264 Subpart D and 40 Section CFR 264.51 (OAC 3745-54-51). 40 CFR Section 264.52 (OAC 3745-54-52). 40 CFR Section 264.55, .56 (OAC 3745-54-55 through 56).	Each facility operator must have a contingency plan designed to minimized hazards to human health or the environment due to fires, explosions, or any unplanned releases of hazardous waste constituents to the air, soil, or surface/groundwater. Contingency plans should address procedures to implement a response to incidents involving hazardous waste, and provide for: internal and external communications, arrangements with local emergency authorities, an emergency coordinator list, a facility emergency equipment list indicating equipment descriptions and locations, and a facility personnel evacuation plan. Each facility must have an emergency coordinator who: (1) has responsibility for coordinating emergency response measures; (2) is on the premises or on call at all times; (3) is throughly familiar with all aspects of the contingency plan, facility operations, location and characteristics of waste handled, location of pertinent records, and facility layout; and (4) has the authority to commit the resources necessary to implement the contingency plan in the event of an emergency.	Relevant and Appropriate (This requirement will be applicable to non-excluded solid wastes that exhibit a hazardous characteristic.)	Residues removed from this OU might be treated, stored, and disposed in accordance with TSD facility standards. These requirements are relevant and appropriate because the materials in Silos 1 and 2 are sufficiently similar to hazardous waste.

TABLE A-3 (continued)

RCRA Subtitle C (continued)	Requirement	ARAR/TBC	Rationale for Implementation
Closure, 40 CFR Part 264 Subpart G. 40 CFR Section 264.111 (OAC 3745-55-11).	An operator must close facilities in a manner that: ! Minimizes the need for further maintenance; ! Minimizes post-closure escape of hazardous constituents; and ! Complies with specific, unit-type closure requirements.	Relevant and Appropriate (This requirement will be applicable to non-excluded solid wastes that exhibit a hazardous characteristic.)	These requirements are relevant and appropriate because the residues are sufficiently similar to hazardous waste and some remedial alternatives might require closure as outlined in this standard.
40 CFR Section 264.114 (OAC 3745-55-14).	Contaminated equipment, structures and soils must be properly disposed or decontaminated.		
40 CFR Section 264.116 (OAC 3745-55-16).	Following closure, a survey plot showing the location of hazardous waste disposal units, with respect to surveyed benchmarks, must be filed with the legal total zoning authority.		

<END OF PAGE>

TABLE A-3 (continued)

RCRA Subtitle C (continued)	Requirement	ARAR/TBC	Rationale for Implementation
Container Storage, 40 CFR Part 264 Subpart I 40 CFR Section 264.171 – 178 (OAC 3745-55-71 through - 78).	Containers of RCRA hazardous waste must be: ! Maintained in good condition; ! Compatible with hazardous waste to be stored; ! Closed during storage (except to add or remove waste); and ! Managed in a manner that will not cause the container to rupture or leak. Storage areas must be inspected weekly for leaking and deteriorated containers and containment systems. Containers must be placed on a sloped, crack-free base, and protected from contact with accumulated liquid. A containment system with a capacity of 10 percent of the volume of the largest container of free liquids must be provided. Spilled or leaked waste must be removed in a timely manner to prevent overflow of the containment system. Incompatible materials must be separated. Incompatible materials stored near each other must be separated by a dike or other barrier. At closure, hazardous waste and residue from the containment system must be removed, and containers, liners, bases, and soils must be removed or decontaminated.	Relevant and Appropriate (This requirement will be applicable to non-excluded solid wastes that exhibit a hazardous characteristic.)	These requirements are relevant and appropriate for alternatives utilizing containers for temporary storage or storage before disposal. These requirements are relevant and appropriate because the residues in the silos are sufficiently similar to hazardous waste.

TABLE A-3 (continued)

RCRA Subtitle C (continued)	Requirement	ARAR/TBC	Rationale for Implementation
Tank Systems, 40 CFR Part 264 Subpart J (OAC 3745-55-91 through 96).	Design, operating standards, and inspection requirements for tank units within which hazardous waste is stored or treated. Includes the following: ! Tank design must be compatible with the material being stored. ! Tank must be designed and have sufficient strength to store or treat waste in order to ensure that it will not rupture or collapse. ! Tank must have secondary containment that is capable of detecting and collecting releases to prevent migration of wastes or accumulated liquids to the environment.	Relevant and Appropriate (This requirement will be applicable to non-excluded solid wastes that exhibit a hazardous characteristic.)	Design criteria, operating standards, and inspections for tank treatment units might be relevant and appropriate for alternatives utilizing treatment or storage in a tank prior to disposal. These requirements are relevant and appropriate because the residues in the silos are sufficiently similar to hazardous waste.
Closure Requirements for Tanks, 40 CFR Section 264.197 (OAC 3745-55-97).	At closure, the facility owner must do the following: ! Remove waste residues; ! Remove or decontaminate tank system components; ! Remove or decontaminate contaminated soils and structures; ! Manage all of the above as hazardous wastes; and ! If all contaminated soils cannot be removed, meet the landfill requirements of 40 CFR Section 264.310.	Relevant and Appropriate (This requirement will be applicable to non-excluded solid wastes that exhibit a hazardous characteristic.)	Silos 1 and 2 are tanks, according to the definitions of 40 CFR Section 264.10, which contain wastes sufficiently similar to hazardous waste. These requirements are relevant and appropriate because the circumstances and wastes subject to potential release are similar to the releases that RCRA is designed to address. These standards will also pertain to closure of any tanks and appurtenances used to store or treat these residues during remediation.

TABLE A-3 (continued)

RCRA Subtitle C (continued)	Requirement	ARAR/TBC	Rationale for Implementation
Miscellaneous Units, 40 CFR Part 264 Subpart X (40 CFR Sections 264.601, .602 and OAC 3745-57-91 and 92).	Environmental performance standard, monitoring, inspection, and post-closure care for treatment in miscellaneous units as defined in 40 CFR Section 260.10.	Relevant and Appropriate (This requirement will be applicable to non-excluded solid wastes that exhibit a hazardous characteristic.)	Miscellaneous units might be utilized under various alternatives to remediate waste that is sufficiently similar to hazardous wastes. These units might include mixers, vitrifiers, or other units.
Corrective Action for Solid Waste Management Units, 40 CFR Part 264 Subpart S and 40 CFR Sections 264.552, .553.	Corrective action management units might be designated at the site as areas where remediation wastes (solid, hazardous, or contaminated media and debris) might be placed during the process of remediation. Temporary units consisting of tanks and container storage units might be used to store and treat hazardous waste during the process of corrective action.	Relevant and Appropriate (This requirement will be applicable to non-excluded solid wastes that exhibit a hazardous characteristic.)	During the process of remediation, waste materials might require temporary management in containment buildings, temporary units, stockpiles, or other land based units for the purpose of staging, treating or disposing the material. Materials generated from remediation of the Silos 1 and 2 material are considered remediation wastes. Some of the waste material might exhibit a RCRA characteristic, or otherwise be sufficiently similar to hazardous waste to make this requirement relevant and appropriate.

TABLE A-3 (continued)

RCRA Subtitle C (continued)	Requirement	ARAR/TBC	Rationale for Implementation
Containment Buildings, 40 CFR Part 264 Subpart DD and 40 CFR Section 264.1101, .1102.	Hazardous waste and debris might be placed into units known as containment buildings for the purpose of interim storage or treatment. Containment buildings must be fully enclose to prevent exposure to the elements and ensure containment of managed wastes. Floor and containment walls must be designed and constructed of materials of sufficient strength and thickness to support themselves, the waste contents, and any personnel and heavy equipment that operate within the unit. Surfaces coming in contact with hazardous waste must be chemically compatible with waste. Primary barriers must be constructed to prevent migration of hazardous constituents into barrier. Secondary containment systems including secondary barriers and leak detection systems must also be constructed for containment buildings used to manage wastes containing free liquids. Controls must be implemented to ensure: the primary barrier is free of significant cracks, corrosion, or other deterioration that may allow release of hazardous waste; the level of hazardous waste does not exceed height of containment walls and is otherwise maintained within containment walls; tracking of waste out of unit by personnel or equipment used in handling waste is prevented; and fugitive dust emissions are controlled at the level of no visible emissions.	Relevant and Appropriate (This requirement will be applicable to non-excluded solid wastes that exhibit a hazardous characteristic.)	During the process of remediation, waste materials might require temporary management for the purpose of staging or treating the material. Some of the waste material might exhibit a RCRA characteristic, or otherwise be sufficiently similar to hazardous waste to make this requirement relevant and appropriate.

TABLE A-3 (continued)

RCRA Subtitle C (continued)	**Requirement**	**ARAR/TBC**	**Rationale for Implementation**
Radiation Dose Limit (All Pathways), Proposed 10 CFR Part 834.	The exposure of members of the public to radiation sources as a consequence of all routine DOE activities shall not cause, in a year, an EDE greater than 100 mrem from all exposure pathways.	To be considered	Radiation sources from this OU (i.e., a DOE-owned facility) might contribute to the total dosage to members of the public.
CAA	Requirement	ARAR/TBC	Rational for Implementation
Control of Fugitive Dust, OAC 3745-17-08.	Visible emissions of fugitive dust generated during grading, loading, or construction operations and other practices that emit fugitive dust shall be minimized or eliminated.	Relevant and Appropriate	The implementation of remedial action alternatives will require the movement of dirt and other material likely to result in fugitive dust emissions. This requirement is relevant and appropriate because the FEMP is not located in an area subject to this regulation.
Prevention of Air Pollution Nuisance, ORC 3704.01-.05 and OAC 3745-15-07.	Measures shall be taken to adopt and maintain a program for the prevention, control, and abatement of air pollution in order to protect and enhance the quality of the state's air resource so as to promote the public health, welfare, and economic vitality of the people of the state. The emission or escape into open air from any source whatsoever of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors, and combinations of the above in such a manner or in such amounts as to endanger the health, safety, or welfare of the public or to cause unreasonable injury or damage to property shall be declared a public nuisance and is prohibited.	Applicable	During the remediation process, some potential exists for emissions of radionuclides and toxic chemicals to the air, which might endanger individuals or damage property.

TABLE A-3 (continued)

CAA (continued)	Requirement	ARAR/TBC	Rationale for Implementation
Control of Visible Particulate Emissions from Stationary Sources, OAC 3745-17-07.	Discharge of particulate emissions of a shade or density greater than 20 percent opacity into ambient air from any stack is prohibited. Transient limits are included in this regulation.	Applicable	Treatment operations for various alternatives might result in the release of particulate material.
Permit to Install, OAC 3745-31-05(A)(3).	The director shall issue a permit to install if he/she determines that the installation or modification and operation of the air contaminant source will employ the best available technology.	Relevant and Appropriate	Although an administrative permit to install is not required for alternatives involving treatment, the substantive requirements of this section must be met by employing Best Available Technology for treating particulate and other off-gas emissions.

<END OF PAGE>

TABLE A-3 (continued)

CAA (continued)	Requirement	ARAR/TBC	Rationale for Implementation
Restrictions on Particulate Emissions from Industrial Processes, OAC 3745-17-11.	This requirement establishes numerical emission release limits for particulate material from industrial sources. Any source (operation, process, or activity) shall be operated so that particulate emissions do not exceed allowable emission rates specified in this regulation [based on processing weights (Table 1) or uncontrolled mass rate of emissions (Figure II) of OAC 3745-17-11]. A source complies with Table 1 requirements if its rate of particulate emission is always equal to or less than the allowable rate of particulate emission based on the maximum capacity of the source: Process Rate at Maximum Capacity (lb/hr) — Allowable Rate of Particulate Emission (lb/hr)[1] 100 — 0.551 200 — 0.877 400 — 1.40 600 — 1.83 800 — 2.22 1000 — 2.58 [1] Excerpted from Table 1 of OAC 3745-17-11.	Applicable	Treatment operations for various alternatives might result in release of particulate material that might exceed these standards.

TABLE A-4

OTHER REQUIREMENTS FOR SILOS 1 AND 2 REMEDIAL ACTION ALTERNATIVES

Title	Requirement	Rationale for Implementation
Occupational Safety and Health Administration Worker Protection Requirements, 29 CFR Parts 1904 and 1910.	Establishes requirements to protect workers who could be exposed to radiation, noise, hazardous wastes, or other contaminants or hazards at the remediation site.	This OU is a remediation site under Comprehensive Environmental Response Compensation and Liability Act, as amended. Compliance with 29 CFR Section 1910.120 is required for sites undergoing remediation by 40 CFR Section 300.150.
Department of Transportation Requirements for Transportation of Hazardous Materials, 49 CFR Parts 171-173, 177, 178.	Hazardous materials may not be transported on public highways except in accordance with these regulations: • Part 171, General Requirements. • Part 172, this part establishes shipping papers, marking, labeling, placarding, and emergency response information requirements. • Part 173, this part establishes packaging and other shipping requirements for hazardous materials, including radioactive materials. • Part 177, Requirements of the Transporter. • Part 178, Specifications for Shipping Containers.	Applicable to those alternatives which involve transportation of the waste materials off-site. Radioactive materials and materials sufficiently similar to hazardous wastes might be shipped off-site.
Highway Improvement Act of 1982, 23 United States Code (USC) 127.	Establishes vehicle weight limits for interstate highways.	Applicable to those alternatives which involve transportation of the waste materials off-site.
Hazardous Materials Transportation Act, 49 USC 1801-1812.	Establishes requirements for minimizing environmental impacts of spills or releases of hazardous materials.	Applicable to those alternatives which involve transportation of the waste materials off-site. Radioactive materials and materials sufficiently similar to hazardous wastes might be shipped off-site.

TABLE A-4 (continued)

Title	Requirement	Rationale for Implementation
NTS WAC.	Establishes which wastes may be disposed at a facility.	The NTS WAC would be applicable to disposals at the NTS. NTS operates under DOE Order 435.1, "Radioactive Waste Management."
National Historic Preservation Act, 16 USC 470 et seq.	Protects sites listed or eligible for listing in the National Register of Historic Places.	Required by law for the alternatives affected.
Archaeological and Historic Preservation Act, 16 USC 469.	Preserves artifacts and data associated with archaeological finds.	Required by law for the alternatives affected.
American Indian Religious Freedom Act, 42 USC 1996.	Provides for tribal access by native peoples to grave sites and sites of cultural, symbolic, or religious significance.	Required by law for the alternatives affected.
Native American Graves Protection and Repatriation Act, 25 USC 3001.	Provides for return of human remains and cultural objects from Native American graves to affiliated tribes.	Required by law for the alternatives affected.
Protection and Enhancement of Cultural Environment, Executive Order 11593.	Requires inventory of site for potential historic places for eligibility in the National Register of Historic Places.	Required by law for the alternatives affected.
Fish and Wildlife Coordination Act, 16 USC 66 et seq.	Requires consultation with other state agencies on activities that might affect any body of water for the conservation of fish and wildlife resources.	Required by law for the alternatives affected.

TABLE A-4 (continued)

Title	Requirement	Rationale for Implementation
Archaeological Resources Protection Act, 16 USC 470 (a).	Requires permit for removal of any archaeological resources from federal lands.	Required by law for the alternatives affected.
Antiquities Act and Historic Sites Act, 16 USC 431-433 and 16 USC 461-467.	Requires identification and preservation of cultural resources on federal lands; includes natural landmarks.	Required by law for the alternatives affected.
Farmland Protection Policy Act, 7 USC 4201 et. Seq.	Requires protection and maintenance of farmland for its beneficial use as a national resource.	Required by law for the alternatives affected.
Occupational Radiation Protection, 10 CFR Part 835.	Provides standards for occupational radiation protection of workers at DOE facilities.	Required by law for safety and worker protection at DOE facilities (replaces former DOE Order 5480.11).
DOE Order	**Title**	**Rationale for Implementation**
5400.3	Hazardous and Mixed Waste Program	Contractual obligation for activities at DOE facilities.
5400.5	Radiation Protection of the Public and the Environment	Contractual obligation for activities at DOE facilities.
451.1A	NEPA Compliance Program	Contractual obligation for activities at DOE facilities.
5480.1B	Environmental, Safety, and Health Program for DOE Operations	Contractual obligation for activities at DOE facilities.
460.1A	Packaging and Transportation Safety	Contractual obligation for activities at DOE facilities.
460.2	Departmental Materials Transportation and Packaging Management	Contractual obligation for activities at DOE facilities.

TABLE A-4 (continued)

DOE Order	Title	Rationale for Implementation
5480.4	Environmental Protection, Safety, and Health Protection Standards	Contractual obligation for activities at DOE facilities.
440.1A	Worker Protection for DOE Federal and Contractor Employees	Contractual obligation for activities at DOE facilities.
435.1	Radioactive Waste Management	Contractual obligation for activities at DOE facilities.
414.1	Quality Assurance	Contractual obligation for activities at DOE facilities.
430.1A	Life Cycle Asset Management	Contractual obligation for activities at DOE facilities.

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APPENDIX B
RESPONSIVENESS SUMMARY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
SILOS 1 AND 2 MATERIAL

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ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
AWR	Accelerated Waste Retrieval
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, as amended
CFR	Code of Federal Regulations
COC	constituent of concern
DOE	U.S. Department of Energy
DOE-NV	U.S. Department of Energy-Nevada Field Operations
DOT	Department of Transportation
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FCAB	Fernald Community Advisory Board
FEMP	Fernald Environmental Management Project
FRESH	Fernald Residents for Environmental Safety and Health
FS	Feasibility Study
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NTS	Nevada Test Site
NTS-CAB	Nevada Test Site Community Advisory Board
OEPA	Ohio Environmental Protection Agency
ORNL	Oak Ridge National Laboratory
OSDF	On-site Disposal Facility
OU	operable unit
PA	performance assessment
POP	Proof of Principle
PP	Proposed Plan
RCRA	Resource Conservation and Recovery Act, as amended
RFP	Request for Proposal
RI	Remedial Investigation
ROD	Record of Decision
TCLP	Toxicity Characteristic Leaching Procedure
WAC	waste acceptance criteria

B.1.0 PURPOSE

As stated in the U. S. Environmental Protection Agency (EPA) Guide to Preparing Superfund proposed Plans, Records of Decision, and Other Remedy selection Decision Documents (EPA 1999), the responsiveness summary serves three important purposes. First it provides the U. S. Department of Energy (DOE) with information about community preferences regarding both the proposed remedial alternative and general concerns about the site. Second, it demonstrates how public and support agency comments were integrated into the decision-making process. Third, it allows DOE to formally respond to public comments.

This Responsiveness Summary has been prepared to meet the requirements of Sections 113(k)(2)(B)(iv) and 117(b) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA). As the lead agency at the Fernald Environmental Management Project (FEMP), DOE is required to respond "...to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on the Revised Proposed Plan for Remedial Action at Silos 1 and 2 (revised PP).

In addition to CERCLA, this Responsiveness Summary has been prepared pursuant to other requirements, including:

- The 1991 Amended Consent Agreement between DOE and the EPA;
- The 1997 Agreement Resolving Dispute Concerning Denial of Request for Extension of Time for Certain OU4 Milestones;
- National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR), Part 300;

- Community Relations in Superfund (Handbook), January 1992, EPA 540-R-92-009; and

- A Guide to Preparing Superfund Proposed Plans, Records of Decision; and Other Remedy Selection Decision Documents, July 1999, EPA 540-R-98-031.

This Responsiveness Summary is used as the mechanism for DOE to identify and document the public involvement with the Revised Feasibility Study for Silos 1 and 2 (revised FS), revised PP, and Supplement Analysis. After public comments and concerns had been formally submitted to DOE, in oral and written form, the comments were summarized into issue statements and responded to accordingly. The actual written comments received are included in **Attachment B.1 of Appendix B.**

Section B.2.0 of this Responsiveness Summary gives an overview of the public's involvement in the development and approval of the revised FS, revised PP, and Supplement Analysis. **Section B.3.0** discusses the development of the issue statements and presents the public concerns and DOE responses.

<END OF SECTION>

B.2.0 COMMUNITY PARTICIPATION FOR SILOS 1 AND 2

B.2.1 Public Comment Period

The DOE recently held a public comment period from April 3 through May 18, 2000, for interested parties to comment on the modified selected remedy for the Silos 1 and 2 material within Operable Unit 4 (OU4) at the FEMP in Fernald, Ohio. In addition, two public hearings, one in Fernald, Ohio (April 25, 2000) and the other in Las Vegas, Nevada (May 3, 2000) were held to provide the public with a forum to submit oral comments on the proposed revised remedy. The public comment period was held in accordance with Section 117 of CERCLA.

The purpose of this Responsiveness Summary is to document DOE's responses to comments received during the public comment period. These comments were considered before selecting the final remedy for the Silos 1 and 2 material, which is detailed in this amendment to the Record of Decision (ROD).

B.2.2 Community Involvement

DOE is responsible for conducting the community relations for the FEMP. A community relations program was established for the FEMP in 1985 to provide information about the site regarding updates and progress of the clean-up activities.

In November 1993, DOE implemented a public participation program at Fernald to involve community members and other interested parties in the decision-making process at the site. This Fernald Community Advisory Board (FCAB), formerly known as the Fernald Citizens Task Force, was chartered to provide DOE, EPA, and Ohio Environmental Protection Agency (OEPA) with recommendations about cleanup solutions and future courses of action at the FEMP. These efforts, along with the community relations activities required by CERCLA, reflect DOE's intent to fully involve the community in the decision-making process.

More recently, DOE has encouraged public inspection and informal comment on drafts of the revised FS and revised PP documents, prior to EPA approval. This approach has provided a genuine opportunity for stakeholders to identify issues, voice their concerns, and learn about proposed clean-up plans for Silos 1 and 2 material. The informal opportunity for the public to provide input enabled DOE to address stakeholder questions and concerns in advance of the formal public comment period.

Two Administrative Records, located at the Public Environmental Information Center in Harrison, Ohio and EPA Region V offices in Chicago, Illinois have been established to provide an information repository on the decision-making process for interested members of the public.

During the decision-making process documented in this ROD Amendment, DOE solicited feedback and informed stakeholders. The DOE sponsored several community briefings and workshops both locally and at the Nevada Test Site (NTS) to share the data supporting the evaluation of alternatives in the revised FS and revised PP on an informal basis. In addition, the DOE has sponsored formal public hearings regarding the revised PP both locally and at the NTS to provide the public a forum to submit oral comments on the preferred alternative identified in the revised PP. **Table B.2-1** presents a summary of these public involvement opportunities.

TABLE B.2-1
SUMMARY OF PUBLIC INVOLVEMENT OPPORTUNITIES

Meeting Topic	Location/Date
Preliminary Screening of Alternatives	FEMP/December 1997
Presentation of Proof of Principle testing data	FEMP/July 13, 1999
Summary of Detailed Analysis of Silos 1 and 2 FS	FEMP/October 12, 1999
FCAB	FEMP/October 14, 1999
FS overview with FCAB	FEMP/November 4 and 6, 1999
Summary of Comparative Analysis of Silos 1 and 2 FS	FEMP/November 17, 1999
Nevada Test Site Citizens Advisory Board (NTS-CAB) Summary of Silos 1 and 2 FS Comparative Analysis	Las Vegas, Nevada/December 1, 1999
FCAB Proposed Plan Summary	FEMP/December 6, 1999
Formal Public Hearing on Silos 1 and 2 revised PP	FEMP/April 25, 2000
Formal Public Hearing on Silos 1 and 2 revised PP	Las Vegas, Nevada/May 3, 2000

<END OF PAGE>

To augment public involvement throughout the revised Silos 1 and 2 remedy decision-making process [i.e., Proof of Principle (POP) testing, revised FS, revised PP], the DOE utilized an independent technical review team comprised of technical and process experts to objectively review and evaluate the remedial alternatives.

B.2.3 Public Meetings

Written transcripts of the public hearings conducted on April 25, 2000 at the Alpha Building, Classroom D, Harrison, Ohio and on May 3, 2000 at the DOE's Nevada Support Facility, Sedan Conference Room, Las Vegas, Nevada are attached in **Attachments B.I** and **B.II**, respectively.

<END OF PAGE>

B.3.0 SUMMARY OF ISSUES AND RESPONSE

The revised FS (including the Supplement Analysis) and revised PP were released for public comment on April 3, 2000. The DOE reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as was originally identified in the revised FS and revised PP, were necessary.

This Responsiveness Summary document addresses on the formal comments submitted during the public comment period and oral comments received during the April 25, 2000 public hearing held in Harrison, Ohio and the May 3, 2000 public hearing held in Las Vegas, Nevada. Within this Responsiveness Summary, verbal and written comments (see **Attachments B.I - B.III)** were categorized into significant issues. For each of these issues, an issue statement has been prepared that addresses the concerns expressed by the commentors. In many instances, the issue statements are paraphrased from the original comments to succinctly represent the combined concerns of several commentors. The issues resulting from formal comments have been compared with the questions raised during the public question and answer sessions to ensure that all significant issues are represented by the issue statements.

For the purpose of developing issue statements, a comment is considered significant if it involves:

- The definition of the preferred alternative;
- Public or state acceptance of the preferred alternative;.
- The implementation or impacts of the preferred alternative;
- Conclusions drawn from evaluations or assessments provided within the document;

- Safety of the work performed; or the
- Enforceability of the decision reached.

At the end of each issue statement, the specific comment letter(s) or oral comment(s) in which the issue was raised is identified in parentheses. Each comment is provided an alphabetic identifier. These comments are also part of the administrative record for this action. **Table B.3-1** provides a cross-reference of the alphabetic identifiers with the commentors. A reference to **Attachment B.I** indicates a verbal comment submitted at the Public Hearing held April 25, 2000 at Fernald. A reference to **Attachment B.II** indicates a verbal comment submitted at the Public Hearing held May 3, 2000 at the NTS. A reference to **Attachment B.III** indicates a written comment submitted during the Public Comment Period held between April 3 and May 18, 2000.

<END OF PAGE>

TABLE B.3-1

FORMAL VERBAL AND WRITTEN COMMENTS RECEIVED

COMMENT			RESPONSE		
Commentor	**Issue No.**	**Page No.**	**Identification**	**Page No.**	**Brief Description of Issue**
Formal Verbal Comments					
Lisa Crawford Fernald Residents for Environmental Safety and Health (FRESH)	1	B-I-55	A	B.3-11	Long-term protectiveness
	2	B-I-55	B	B.3-12	Completeness of cost estimates in evaluating alternatives
	3	B-I-56	C	B.3-13	Waste minimization
Joanne Wilson	1	B-I-56	D	B.3-14	Radium extraction for medical use
Carol Schroer FRESH	1	B-1-63	E	B.3-16	Ensuring protection of human health (both worker and the public) and the environment during remediation
Edwa Yocum FRESH	1	B-I-64	F	B.3-16	Opposition to disposal of Silos 1 and 2 material in the On-site Disposal Facility (OSDF) should the NTS close
Douglas Davis Toledo Engineering Company (TECO Engineering)	1	B-1-56	A	B.3-11	Long-term protectiveness
	2	B-1-66	G	B.3-17	Commercial glass-making experience in evaluation of vitrification
Jerry Gels	1	B-I-67	D	B.3-14	Radium extraction for medical use
Unidentified Speaker	1	B-II-43	H	B.3-17	Energy consumption as criterion for evaluation of alternatives

COMMENT			RESPONSE		
Commentor	**Issue No.**	**Page No.**	**Identification**	**Page No.**	**Brief Description of Issue**
Formal Verbal Comments					
Dennis Bechtel NTS-CAB	1	B-II-44	I	B.3-18	Rationale for disposal at the NTS
	2	B-II-45	J	B.3-20	Measures to prevent degradation of chemical stabilized waste
	3	B-II-46	K	B.3-21	Cumulative risk from all DOE shipments to the NTS
	4	B-II-48	L	B.3-22	State and community acceptance
Dale Schutte	1	B-II-48	M	B.3-23	Minimization of transportation risk through routing including evaluating intermodal transportation
	2	B-II-51	DD	B.3-42	Public comment period.
John Phillips NTS-CAB	1	B-II-49	E	B.3-16	Ensuring protection of human health (both worker and the public) and the environment during remediation
Don Cloquet	1	B-II-50	M	B.3-23	Minimization of transportation risk through routing including evaluating intermodal transportation
Formal Written Comments					
Joanne Wilson	1	B-III-2	D	B.3-14	Radium extraction for medical use
Jerry Gels	1a	B-III-5	A	B.3-11	Long-term protectiveness
	1b	B-III-5	N	B.3-24	Short-term effectiveness - Worker risk
	2	B-III-5	D	B.3-14	Radium extraction for medical use

COMMENT			RESPONSE		
Commentor	**Issue No.**	**Page No.**	**Identification**	**Page No.**	**Brief Description of Issue**
Formal Verbal Comments					
Jerry Gels (cont'd)	3	B-III-5	O	B.3-25	Health physics evaluation of radionuclides particularly radium-226 and radon-222
Kenneth Moore	1	B-III-6	D	B.3-14	Radium extraction for medical use
J.E. Walther	1	B-III-8	E	B.3-16	Ensuring protection of human health (both worker and the public) and the environment during remedition
Dennis Bechtel NTS-CAB	1	B-III-10	I	B.3-18	Rationale for disposal at the NTS
	2a	B-III-11	J	B.3-20	Measures to prevent degradation of chemical stabilized waste
	2b	B-III-11	A	B.3-11	Long-term protectiveness
	2c	B-III-11	P	B.3-26	Ability of chemical stabilized waste to meet the State of Nevada WAC
	3	B-III-11	K	B.3-21	Cumulative risk from all DOE shipments to the NTS
	4	B-III-12	Q	B.3-27	Specifying transportation routes to carriers
	5	B-III-13	L	B.3-22	State and community acceptance
Phil Claire NTS-CAB	1	B-III-16	I	B.3-18	Rationale for disposal at the NTS

COMMENT			RESPONSE		
Commentor	**Issue No.**	**Page No.**	**Identification**	**Page No.**	**Brief Description of Issue**
Formal Verbal Comments					
Phil Claire NTS-CAB (cont'd)	2a	B-III-16	J	B.3-20	Measures to prevent degradation of chemical stabilized waste
	2b	B-III-16	A	B.3-11	Long-term protectiveness
	2c	B-III-16	P	B.3-26	Ability of chemical stabilized waste to meet the State of Nevada WAC
	3	B-III-17	M	B.3-23	Minimization of transportation risk through routing including evaluating intermodal transportation
	4	B-III-17	K	B.3-21	Cumulative risk from all DOE shipments to the NTS
	5	B-III-17	Q	B.3-27	Specifying transportation routes to carriers
	6	B-III-18	L	B.3-22	State and community acceptance
	7	B-III-18	R	B.3-28	Equity for NTS stewardship costs
	8	B-III-18	H	B.3-17	Energy consumption as criterion for evaluation of alternatives
Kenneth Reim	1	B-III-19	H	B.3-17	Energy consumption as criterion for evaluation of alternatives
	2	B-III-19	N	B.3-24	Short-term effectiveness – Worker risk

COMMENT			RESPONSE		
Commentor	**Issue No.**	**Page No.**	**Identification**	**Page No.**	**Brief Description of Issue**
Formal Verbal Comments					
Kenneth Reim (cont'd)	3	B-III-19	S	B.3-29	Short-term effectiveness – Time to achieve protectiveness
	4	B-III-19	B	B.3-12	Completeness of cost estimates in evaluating alternatives
	5	B-III-19	M	B.3-23	Minimization of transportation risk through routing including evaluating intermodal transportation
Richard Nocilla NTS-CAB	1	B-III-21	M	B.3-23	Minimization of transportation risk through routing including evaluating intermodal transportation
Telfer	1	B-III-34	M	B.3-23	Minimization of transportation risk through routing including evaluating intermodal transportation
Douglas Davis TECO Engineering And David Bennert InnovaTech Services	1	B-III-36	A	B.3-11	Long-term protectiveness
	2a	B-III-36	T	B.3-30	Reduction of toxicity, mobility, or volume through treatment – Volume reduction
	2b	B-III-37	U	B.3-31	Reduction of toxicity, mobility, or volume through treatment – Secondary waste
	3	B-III-37	N	B.3-24	Short-term effectiveness – Worker risk
	4	B-III-37	S	B.3-29	Short-term effectiveness – Time to achieve protectiveness
	5a	B-III-38	A	B.3-11	Long-term protectiveness

COMMENT			RESPONSE		
Commentor	**Issue No.**	**Page No.**	**Identification**	**Page No.**	**Brief Description of Issue**
Formal Verbal Comments					
Douglas Davis TECO Engineering And David Bennert InnovaTech Services (cont'd)	5b	B-III-38	V	B.3-32	Radon emanation over the life of treated waste
	6	B-III-38	W	B.3-34	Implementability – Operability and controllability and exclusion of commercial glass-making experience
	7	B-III-39	W	B.3-34	Implementability – Process reliability
	8	B-III-39	W	B.3-34	Implementability – Process control
	9	B-III-40	X	B.3-36	Optimization of VIT1 container
	10	B-III-41	Y	B.3-38	VIT1 Cost
	11	B-III-42	Z	B.3-39	Reevaluation of VIT1 using 30 ton per day melter and producing frit
Jim Hansen Geosafe Corporation	1	B-III-43	A	B.3-11	Long-term protectiveness
	2	B-III-44	Y,AA	B.3-38 & B.3-39	Representativeness of vitrification technologies used in the revised FS for evaluation of the five balancing criteria
	3	B-III-44	BB	B.3-40	Revising ROD to include off-site treatment
	4	B-III-46	CC	B.3-41	Exclusion of Geosafe's commercial experience in treating hazardous and radioactive waste

COMMENT			RESPONSE		
Commentor	**Issue No.**	**Page No.**	**Identification**	**Page No.**	**Brief Description of Issue**
Formal Verbal Comments					
Jim Hansen Geosafe Corporation (cont'd)	5	B-III-46	AA	B.3-39	Representativenss of vitrification technologies used in the revised FS
	6	B-III-46	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS
	7	B-III-46	A	B.3-11	Long-term protectiveness
	8	B-III-46	A	B.3-11	Long-term protectiveness
	9	B-III-47	A	B.3-11	Long-term protectiveness
	10	B-III-47	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS
	11	B-III-47	V	B.3-32	Radon emanation over the life of treated waste
	12	B-III-47	N	B.3-24	Short-term effectiveness – Worker risk
	13	B-III-47	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS
	14	B-III-48	S	B.3-29	Short-term effectiveness – Time to achieve protectiveness
	15	B-III-48	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS
	16	B-III-48	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS
	17	B-III-48	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS

COMMENT			RESPONSE		
Commentor	**Issue No.**	**Page No.**	**Identification**	**Page No.**	**Brief Description of Issue**
Formal Verbal Comments					
Jim Hansen Geosafe Corporation (cont'd)	18	B-III-48	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS
	19	B-III-48	S	B.3-29	Short-term effectiveness – Time to achieve protectiveness
	20	B-III-48	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS
	21	B-III-49	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS
	22	B-III-49	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS
	23	B-III-49	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS
	24	B-III-49	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS
	25	B-III-49	AA	B.3-39	Representativeness of vitrification technologies used in the revised FS
	26	B-III-49	A	B.3-11	Long-term protectiveness

Issue: A

Comment: Commentors expressed concern over the durability of the chemical stabilized wasteform both during a highway accident and in regard to long-term protectiveness to human health and the environment after disposal.

Response: Both vitrification and chemical stabilization result in a treated waste that provides protection of human health and the environment. As documented in the Remedial Investigation/Feasibility Study (RI/FS) for OU4, the principal chemical constituent of concern for Silos 1 and 2 material and the focus for stabilization of the material is lead, whose concentration in leachate can exceed limits prescribed under the Resource Conservation and Recovery Act, as amended (RCRA). Both technologies stabilize lead by chemically converting it into a leach-resistant form. Based on this chemical conversion alone, both technologies show the ability to reduce the leaching of lead to meet disposal facility requirements when analyzed using the Toxicity Characteristic Leaching Procedure (TCLP). Long-term protection of human health and the environment at the NTS is dependent on the ability of the technologies to reduce leaching by chemically converting the lead into a leach-resistant chemical form not the physical integrity of the solidified wasteform.

In addition, as part of the evaluation of transportation risk, the DOE evaluated the risk to the public resulting from a transportation accident using the RADTRAN5® computer model. The resulting risk numbers were based on the probability of an accident occurring during transportation combined with the probability of the accident resulting in release of material from the container. Because the chemical stabilization alternatives result in a greater number of shipments, the resulting risk from a potential accident is greater than that for vitrification. However, the resulting incremental lifetime cancer risk from a potential accident for each alternative is within the CERCLA guidelines.

Issue: B

Comment: Concern was raised over the completeness of the cost estimate. In particular, a concern was raised regarding the potential costs for the addition of a wastewater treatment facility for the CHEM2 alternative.

Response: Although cost-effectiveness is a key factor in selecting the remedy for Silos 1 and 2 material, the difference in estimated cost of the chemical stabilization and vitrification alternatives was not of sufficient magnitude to be a discriminating factor between the alternatives. Any potential costs of a wastewater treatment facility for the CHEM2 alternative would not modify this determination.

The total estimated cost for the wastewater treatment system associated with the CHEM1 process option is approximately $700,000. This includes the costs associated with engineering, procurement, construction, and operation of the facility, as well as transportation and disposal of wastewater treatment bag filters. In the event the CHEM2 process option would require a water treatment system, it would be conceptually very similar to the one described in the CHEM1 process. Assuming similar operational costs as those estimated for the CHEM1 process option results in an increase of approximately $700,000 (0.2% of the current estimated total cost for implementing CHEM2) to the total cost of the CHEM2 process option.

Issue: C

Comment: Concern was raised regarding the DOE's commitment to minimizing the volume of waste generated by the selected treatment technology.

Response: It is DOE policy, in accordance with Executive Order 12856, whenever feasible to apply pollution prevention and waste minimization principles into the design and operation of all its facilities. Accordingly, the technical specification for the Request for Proposal (RFP) to be issued for this project contains provisions for the future contractor to incorporate pollution prevention and waste minimization features during the design effort. One of the evaluation criteria to be used in selecting the future contractor is the degree to which his design exhibits minimization of primary and secondary wastestreams. As part of the CERCLA remedial design process EPA and OEPA will have the opportunity to review and approve the Contractor's design.

Issue: D

Comment: The decision-making process for the Silos 1 and 2 treatment remedy should consider the potential medical benefits that the 10 pounds of radium-226 in the Silos 1 and 2 material may have to offer.

Response: The DOE has taken positive steps to move forward with both the clean up plans for the radium-bearing Silos 1 and 2 material at the FEMP and to assist the medical community with efforts to find ways to identify radium sources that may be available to researchers without impacting the EPA-mandated clean-up schedule. The DOE's Office of Nuclear Energy's Isotope Production and Distribution Division has monitored the progress and supported the medical community's radiotherapy research efforts since the potential opportunities were first recognized in 1995.

While the actual future need for radium-226 is not yet certain, there are significant issues which would need to be addressed to determine the feasibility for recovery of the 10 pounds of radium-226 from the 20,000,000 pounds of Silos 1 and 2 material for medical research. The issues which include: 1) Determining if the radium-226 can be separated from Silos 1 and 2 material in a medically usable form; 2) Identifying the risk to workers, the public, and the environment posed by recovery of radium-226; and 3) Quantifying the costs for recovery of radium-226.

The Silos 1 and 2 material is the most radioactive waste at the FEMP site and the top priority in the overall cleanup. The CERCLA mandate to protect human health and the environment requires that DOE move forward with efforts to clean-up the FEMP site and make the surrounding community a safer place to live. Therefore, DOE is moving forward with implementation of the chemical stabilization technology for the remediation of Silos 1 and 2 material. However, DOE Office of Nuclear Energy Isotope Production and Distribution will continue to monitor the progress and maintain its support of utilizing radioactive material in cancer research.

On June 9, 2000, DOE issued a news release announcing steps to expand the Energy Department's capacity to provide the bismuth-213 isotope extracted from radioactive materials used in nuclear activities to be used in clinical trials for the treatment of several forms of cancer. Plans call for increasing the supply of the isotope bismuth-213, a decay product of uranium-233 currently in storage at the DOE's Oak Ridge National Laboratory (ORNL), and make it available for use in an expanded cancer treatment research project.

In the near-term, as funds are available, the DOE plans to increase the supply of the bismuth-213 by up to 30 percent over the next year and hopes to double its supply by 2002. Initially, the DOE plans to use the existing extraction and process line at ORNL. The DOE is also planning some long-term actions that would allow for future decisions on the extraction of additional isotopes from larger quantities of uranium-233 at ORNL.

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Issue: E

Comment: Concerns were expressed that the implementation of the selected remedy be performed in manner protective of human health (both worker and the public) and the environment.

Response: The contract for the remediation of the Silos 1 and 2 material will require the Contractor to implement the selected remedy in accordance with applicable and relevant and appropriate requirements (ARARs), to be considered criteria, and other requirements [i.e., Occupational Safety and Health Administration, Department of Transportation (DOT)] that are protective of human health (both workers and the public) and the environment. These requirements are identified in the ROD Amendment and the RFP. DOE, the OEPA, and EPA will all oversee remediation operations to ensure the compliance with identified requirements and ensure protection of human health and the environment is maintained.

Issue: F

Comment: Concern was expressed that the treated Silos 1 and 2 material not be disposed in the FEMP OSDF, in the event the NTS was closed for disposal.

Response: Treated Silos 1 and 2 waste and debris from the concrete structures of Silos 1 and 2 are specifically excluded from on-site disposal by the WAC for the OSDF. Therefore, neither treated Silos 1 and 2 waste nor concrete structures of Silos 1 and 2 can be disposed in the OSDF. Treated Silos 1 and 2 waste and debris from concrete structures of Silos 1 and 2 must be disposed at either the NTS or an appropriately permitted commercial disposal facility.

Issue: G

Comment: During the evaluation of vitrification, more emphasis could have been given to the experience of the commercial glass industry in the areas of short-term effectiveness and implementability.

Response: It is DOE's position that the 15 tons per day melter design, proposed in the revised FS, exceeded the known limit of the joule-heated vitrification technology's demonstrated capability on similar wastestreams to Silos 1 and 2 material by a factor of 3 (M-Area melter was 5 tons per day). DOE recognizes that joule-heated vitrification commercial glass plants routinely operate, at production rates in excess of 100 tons per day. However, full credit for this experience cannot be recognized since the commercial glassmaking feedstreams are very homogeneous to ensure quality control. DOE, Fluor Fernald, Inc., EPA, and OEPA did not elect to accept the increased risk associated with the higher capacity melters for use in treating heterogeneous radioactive or hazardous wastestreams, since none have been demonstrated at this time.

Issue: H

Comment: A comment was raised in regard to the evaluation of energy consumption in comparing vitrification and chemical stabilizations.

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Response: Energy consumption is evaluated as a sub-criterion to the NCP criterion of implementability. Based on the evaluation of the two technologies energy consumption was not considered a discriminating factor. From an operations viewpoint, vitrification is a greater consumer of energy than chemical stabilization due to the high operating temperatures and energy needs. However, chemical stabilization is a greater consumer of energy when evaluating transportation of treated waste to the NTS due to the larger volume of treated waste produced. The advantages displayed by chemical stabilization during operation and the advantages displayed by vitrification with transportation of treated waste negate each other resulting in energy consumption being a non-discriminating factor.

Issue: I

Comment: The rationale for storage of radioactive waste at the NTS should not be supported because of the isolation of Southern Nevada (which is changing rapidly) but rather because the disposal facility will be designed to ensure that the resident population potentially impacted will be protected.

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Response: In letter dated August 10, 1999, from Frank Di Sanza, DOE-Nevada Field Operations (NV) to Paul Liebendorfer, Division of Environmental Protection, the State of Nevada concurred that Silos 1 and 2 material should be considered small quantity 11(e)(2) byproduct material per DOE Order 435.1. As such the letter states that acceptance of the Silos 1 and 2 material for disposal be contingent upon its ability to meet the NTS WAC. By stating the disposal requirements must be met, means the 11(e)(2) byproduct material must be included in the performance assessment (PA) and composite analysis of the NTS, that adequate controls are established for the wastestream based on the evaluations, and the minimum disposal requirements be met. DOE Guidance 435.1-1 uses the Fernald silo material as an example to illustrate this by stating, "Sufficient capacity is available to dispose of the amount of the waste to be generated. The waste is included in the performance assessment and composite analysis, and controls are established. These include provisions for stabilizing the waste and placing it in specially designed boxes, for additional analysis of the cover that will eventually be placed on the disposal unit used, and for additional information in the records for the disposal facility concerning the nature of the waste in this specific disposal unit."

Long-term effects of waste disposal and necessary engineering and administrative controls that need to be incorporated into the design of the disposal cell will be determined based on results of a PA conducted by the NTS. The NTS has previously conducted a PA on the Area #5 Radioactive Waste Management Site (Area #5). The PA resulted in the establishment of volumetric radionuclide concentration limits for acceptance for disposal in Area #5. In addition, the PA indicated that the risk of potential exposure to the public from waste disposal activities through surface water is not significant.

An informal review of the Area #5 PA indicates that chemically stabilized Silos 1 and 2 waste would meet the radionuclide concentration limits. Upon design of the treatment process for Silos 1 and 2, a final review of the treated Silos 1 and 2 waste against the Area #5 concentration limits will be conducted to confirm Area #5 at the NTS remains suitable for disposal of treated Silos 1 and 2 waste. If the treated Silos 1 and 2 waste would fail to meet the radionuclide concentration limits for Area #5, a PA specific to the characteristics associated with treated Silos 1 and 2 waste would be conducted by the NTS to demonstrate the selected disposal location and configuration meets the long-term performance objectives specified by DOE Order 435.1.

Issue: J

Comment: The revised PP should document how the Chemical Stabilization process proposed at Fernald will, if selected, avoid the degradation that occurred at the Rocky Flats facility.

Response: Based on the "Proceedings of the Workshop on Radioactive, Hazardous, and/or Mixed Waste Sludge Management," dated January 1992, the primary reasons for some of the Rocky Flats "Pondcrete" product failures were problems with quality control and process control requirements.

Strict quality control and process control requirements will be incorporated into the contract for remediating Silos 1 and 2 material. The RFP for the remediation of the Silos 1 and 2 material will require the Contractor to demonstrate their proposed formulation through treatability testing before beginning actual treatment operations. The Contractor would be required to implement a process control philosophy (i.e., sampling and analysis, quality control, and configuration management) based on its process treatment formula chemistry to ensure the treated waste meets the NTS WAC.

Issue: K

Comment: Since the majority of Fernald shipments may occur during the same time frame as shipments from other sites, DOE needs to evaluate these shipments in a cumulative sense. In addition to listing shipments from Fernald, DOE must provide information to enable the public to understand the totality of shipments from DOE sites to the NTS to enable the public and governments to understand how these shipments add to the risk.

Response: The "Final Environmental Impact Statement for the Nevada Test Site and Off-site Locations in the State of Nevada," Appendix I, dated August 1996, evaluated the risk to the public resulting from the transportation of radioactive waste to the NTS. The "Record of Decision: Environmental Impact Statement for the Nevada Test Site and Off-site Locations in State of Nevada" states:

"Impacts from vehicle transportation of materials to and from the Nevada Test Site have been analyzed, including Defense Program nuclear material and waste management activities related to radioactive wastes and hazardous materials. The majority of the postulated injuries and fatalities in this analysis would be a result of traffic accidents and not a result of exposure to the transported material or waste. The results of the transportation risk analysis show that the human health risks from the transportation of material or waste are low under any alternative, and are not significant contributors to the total risk from all operations under these alternatives."

DOE is committed to the safe transport of treated Silos 1 and 2 waste to the NTS for disposal. Prior to leaving the FEMP, all shipments would be inspected (e.g., surface radiation levels, proper securing of package) to ensure the packaging complies with DOT requirements for shipping radioactive material (49 CFR Part 173 Subpart I). The routes have been selected in accordance with DOT regulations that require routes be selected based on their ability to minimize radiological risk (49 CFR Section 379.101), and are consistent with those routes agreed upon by DOE and stakeholders.

Issue: L

Comment: Community acceptance, of course, should be more than the statements of those attending public hearings. It should be the total record of meetings with communities and stakeholders. The record of community acceptance should be derived from a number of sources and not merely the results of one hearing.

Response: DOE has included public involvement throughout the remedy selection process. Public involvement has included observation of the POP Testing and review of POP test reports and the revised FS design basis by an independent technical review team, who provided feedback to the public. In addition, public briefings have been held throughout the remedy selection process at both the FEMP and Las Vegas, Nevada. Throughout the process DOE has discussed and incorporated those issues deemed to be important to stakeholders. Table 9.1-1 of the revised PP presents a summary of the public involvement opportunities in the remedy selection process for Silos 1 and 2.

In addition to the public having the opportunity to provide oral comments at the April 25 and May 3, 2000, public hearings, the public has been provided the opportunity to provide written comments between April 3 and May 18, 2000 as part of the public review process. DOE also conducts monthly briefings with the public to provide status of remediation activities at Fernald and to provide the public the opportunity to voice concerns.

Issue: M

Comment: Concerns were raised in regard to minimizing risk to the public during transportation. This included evaluating intermodal transportation.

Response: DOE is committed to the safe transport of treated Silos 1 and 2 waste to the NTS for disposal. Prior to leaving the FEMP, all shipments would be inspected (e.g., surface radiation levels, proper securing of package) to ensure the packaging complies with DOE requirements for shipping radioactive material (49 CFR Part 173 Subpart I. The routes have been selected in accordance with DOT regulations that require routes be selected based on their ability to minimize radiological risk (49 CFR Section 379.101), and are consistent with those routes agreed upon by DOE and stakeholders.

The FEMP has an established shipping program to the NTS using direct truck shipments. Therefore, for costing purposes, the evaluation assumed direct truck shipments to the NTS. Although costs associated with intermodal transport were not evaluated as part of this revised FS, the potential risks associated with intermodal transport were evaluated as part of Appendix E, Summary of Packaging and Transportation Evaluation, of the revised FS.

Issue: N

Comment: Comments were made in regard to evaluation of risk to workers and the public in comparing vitrification and chemical stabilization. In particular, it was stated that safety record in the commercial glass-making industry should be considered in the evaluation.

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Response: In the evaluation of risk to workers and the public, vitrification displayed an advantage over chemical stabilization in regard to risk to the public during transportation. This is due to the volume reduction associated with vitrification resulting in fewer shipments. However, the advantages displayed by vitrification in regard to transportation risk are outweighed by the advantages displayed by chemical stabilization over vitrification in regard to worker risk. As part of the evaluation process an occupational hazard analysis was performed on the each alternative. Based on the analysis it was determined that chemical stabilization presented fewer physical hazards to workers. Because vitrification is a more complex process in relation to chemical stabilization, it presents more physical hazards to workers that must be managed through either engineering or administrative controls.

Issue: O

Comment: The remediation of Silos 1 and 2 material needs to include environmental health physics analysis focusing on all radionuclides, but particularly on radium-226 and releases of radon-222, in Silos 1 and 2 material.

Response: DOE agrees that environmental monitoring is an important aspect of ensuring protection of human health and the environment during remediation activities. The DOE has evaluated the current radon monitoring configuration in the Silos Project Area. The evaluation considered the upcoming remediation activities of Silo 3, the Accelerated Waste Retrieval (AWR) Project and the full-scale Silos 1 and 2 remediation facilities. It has been determined that the current configuration and quantity of the radon monitors was inadequate to monitor the effectiveness of the environmental controls of the anticipated remediation activities.

The DOE and OEPA have agreed on a plan to upgrade the current radon monitoring system to address anticipated deficiencies. The DOE has recently augmented the staffing of an independent technical review team to include a new member who will focus efforts on evaluating the effectiveness of proposed engineering controls and monitoring systems used by the Silo 3, AWR and Silos 1 and 2 Projects to address radon and particulate emissions. Based upon the review of the independent technical review team, additional changes may be implemented by the Silos Projects.

Issue: P

Comment: It is uncertain in the documents whether the chemical stabilization material will meet the State of Nevada Waste Acceptance Criteria.

Response: In letter dated August 10, 1999, from Frank Di Sanza, DOE-NV to Paul Liebendorfer, Division of Environmental Protection, the State of Nevada concurred that Silos 1 and 2 material should be considered small quantity 11(e)(2) byproduct material per DOE Order 435.1. As such the letter states that acceptance of the Silos 1 and 2 material for disposal be contingent upon its ability to meet the NTS WAC. This requires that the Silos 1 and 2 material be treated so that it no longer exhibits the toxicity characteristic. As documented in the RI/FS for OU4, the principal chemical constituent of concern for Silos 1 and 2 material and the focus for stabilization of the material is lead, whose concentration in leachate can exceed limits prescribed under RCRA. Based on the results of POP testing, as well as treatability tests conducted during the FS process, chemical stabilization can effectively treat Silos 1 and 2 material to meet the NTS WAC.

Issue: Q

Comment: While it appears that DOE/Fernald is actively involved in encouraging certain routes for the transportation of the waste to be used, it is unclear why, based on the experience of the Waste Isolation Pilot Project with the transportation of waste, that routes cannot be specified in contracts. Also needing to be noted is how DOE/Fernald intends on monitoring the shipments to ensure that their carriers comply with the routing designations and DOT criteria. Tourism is, of course, Nevada's bread and butter. Given the fact that rightly or wrongly the public does not distinguish between the types of low-level radioactive waste, it is important that DOE avoid situations that could potentially adversely impact our economy and quality of life.

Response: The final selection of routes to transport radioactive material is the responsibility of the carrier. The DOT regulations under 49 CFR Section 379.101(a) state:

"Except as provided in paragraph (b) of this section or in circumstances when there is only one practicable highway route available, considering operating necessity and safety, a carrier or any person operating a motor vehicle that contains a Class 7 (radioactive) material, as defined in 49 CFR 172.403, for which placarding is required under 49 CFR part 172 shall: (1) Ensure that the motor vehicle is operated on routes that minimize radiological risk."

Last minute route detours may be required to avoid construction, vehicular accidents, or inclement weather. The routes have been selected in accordance with DOT regulations that require routes be selected based on their ability to minimize radiological risk (49 CFR Section 379.101), and are consistent with those routes agreed upon by DOE-and stakeholders. Prior to leaving the FEMP, all shipments would be prepared and inspected to ensure compliance with DOT requirements for shipping radioactive material (49 CFR Part 173 Subpart I). Compliance includes, but is not limited to, ensuring packaging maintains radiation levels with DOT specified limits; ensuring shipping papers have been prepared properly, ensuring container is marked and labeled properly, and ensuring the transport vehicle is properly placarded.

Issue: R

Comment: Fernald, and other sites, in remediating their sites adds to the burden of the NTS and Nevadans. To restore equity as well as to ensure that future stewardship costs are defrayed, it is important that cost savings at sites being remediated are made available to the NTS to defray future stewardship costs.

Response: The NTS is a vital link in the DOE-complex environmental restoration mission. The NTS, as well as other DOE-owned sites are subject to annual funding requests and federal budgetary approvals by Congress. As such, it is expected that DOE will continue to request funding on an annual basis to support its stewardship duties and obligations at the NTS including:

- Ensuring safe and compliant storage and disposal of radioactive waste;

- Protecting the environment and personnel from chemical and radiological hazards in accordance with 40 CFR, RCRA; 10 CFR Part 835, "Occupational Radiation Protection;" DOE Order 435.1, "Radioactive Waste Management;" state of Nevada and applicable DOT regulations;

- Ensuring that present and future radiation exposures are kept as low as reasonably achievable and do not exceed the radiation protection standards established in 10 CFR Part 835, "Occupational Radiation Protection;"

- Ensuring Quality Assurance programs are established and implemented to fulfill the requirements of DOE Order 435.1, "Radioactive Waste Management;" and 10 CFR Section 830.120, "Quality Assurance;" and

- Being consistent with applicable federal, state, and local regulations.

Issue: S

Comment: Concerns were raised regarding time to completion (time to achieve protectiveness) as a criterion for evaluating the alternatives. In addition it was stated that vitrification could accelerate schedule by utilizing a larger melter.

Response: The basis for the project schedules presented in the FS for all four alternatives was established on historical experience with remediation projects conducted at the FEMP under CERCLA and DOE Radiological and Safety Programs.

The time period between the approval of the ROD amendment and the initiation of treatment operations (i.e., design, construction, construction acceptance testing, pre-operations, and start-up) for the Silos 1 and 2 remediation is estimated to be 62 months for vitrification, compared to 54 months for chemical stabilization. The difference of eight months between the two schedules is primarily attributed to the time required, based upon lessons learned during start-up of DOE vitrification facilities, to perform Proof of Process testing during start-up of the vitrification facility.

The 15 tons per day melter design, proposed in the revised FS, exceeded the known limit of the joule-heated vitrification technology's demonstrated capability on similar wastestreams to Silos 1 and 2 material by a factor of 3 (M-Area melter was 5 tons per day). DOE recognizes that joule-heated vitrification commercial glass plants operate continuously, at production rates in excess of 100 tons per day, however, full credit for this experience cannot be recognized since the commercial glassmaking feedstreams are very homogenous to ensure quality control. DOE, Fluor Fernald, Inc., EPA, and OEPA did not elect to accept the increased risk associated with the higher capacity melters for use in treating heterogeneous radioactive or hazardous wastestreams, since none have been demonstrated at this time.

Issue: T

Comment: The large volume reduction offered by vitrification should have been given more weight. Vitrification technology excelled in this area based on the desire of DOE to minimize the wasteform produced. Based on the success in reducing the volume of treated waste, and the demonstrated performance of the wastes, the vitrification technology should be "Strongly Favored" for this criterion.

Response: DOE agrees that vitrification has an advantage over chemical stabilization with regard to reduction in volume of treated waste. However, both technologies were equal in their ability to reduce the mobility of lead based on TCLP results. Therefore, vitrification was given a "Favors" rating for the criterion of reduction of toxicity, mobility, or volume through treatment.

Chemical stabilization is recommended as the preferred treatment alternative because it meets the threshold criteria and provides the best balance of tradeoffs compared to vitrification with respect to the five balancing criteria. Specifically, the advantages of chemical stabilization in implementability (commercial demonstration, operability, ease of acceleration, and constructability) and short-term effectiveness (worker risk and time to protection) are judged to outweigh the advantages of vitrification due to its lower treated waste volume.

Issue: U

Comment: The amount of secondary waste generated by vitrification technologies is very similar to that from chemical stabilization. These differences are insignificant in terms of the total waste generated, and do not justify a "Favorable" rating for the stabilization technologies.

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Response: DOE agrees with this statement. As presented in Figure 8.1-1 of the revised PP that was issued for public review, the subcriterion of "Secondary Waste Generation" was given a "Neutral" rating between the technologies. However, the vitrification technologies have the greater potential to generate secondary wastestreams, which although their volume is relatively small, are more difficult to handle and to treat for disposal (i.e., salts, reduced metals, spent refractory, mixed waste).

Issue: V

Comment: Statements relative to radon release are true; however, they omit recognition that the overall amount of radon released from the vitrified wasteform throughout its lifetime will be far less than that released by the chemically stabilized wasteform.

Response: The cited text by the reviewer refers to a short-term effectiveness discussion in the revised PP, Section 7.2.2.3. The reviewer's concern is addressed by the revised PP in the last paragraph of Section 7.2.2.2, Long-term Effectiveness and Permanence, which states:

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"The vitrified Silos 1 and 2 material reduces radon emanation more effectively than does the chemically stabilized material. However, the combination of radon mitigation provided by the chemically stabilized material plus the engineered barriers and packaging associated with the disposal of treated materials, effectively controls radon emanation. Both alternatives provide effective control of radon emanation from the treated Silos 1 and 2 material. The impact of radon emissions during remediation is evaluated as part of the short-term effectiveness criterion."

In addition, Section 7.2.1.2 of the revised PP, under the discussion of compliance with chemical-specific ARARs, states:

"Both vitrification and chemical stabilization technologies meet the chemical-specific ARARs associated with potential releases to groundwater, surface water, and air. The most critical chemical-specific ARAR relative to airborne releases relates to radon. The primary limit on radon emanation is the flux limit specified in National Emissions Standards for Hazardous Air Pollutants, 40 CFR Part 61 Subpart Q, of 20 picoCuries per square meter-second. This limit applies to interim storage or final disposal of Silos 1 and 2 material. Both alternatives meet this ARAR during interim storage and after disposal. Both alternatives meet requirements for control of radon, particulate, and other air emissions from remediation activities through incorporation of necessary air-emission treatment. The impact of radon emissions during remediation is evaluated as part of the short-term effectiveness criterion."

Issue: W

Comment: A comment was raised regarding the evaluation of implementability between the alternatives. In particular, concerns were raised regarding the evaluation of operability and controllability, process reliability, and process control, and the exclusion of commercial glass-making experience for evaluating vitrification.

Response: It is stated in the revised FS and revised PP documents that both technology families (VIT and CHEM) could treat the Silos 1 and 2 material and that both technology families would face challenges during implementation of the technology.

Both vitrification and chemical stabilization are difficult to implement because of the nature of the Silos 1 and 2 material requiring remote operations. However, operational risks for both can be controlled. Chemical stabilization is preferred because there is more demonstrated commercial experience with this technology, it is less complex than vitrification and therefore more certain in its ability to be successfully implemented, and it offers the opportunity for schedule acceleration and recovery in the event of unplanned downtime.

Both vitrification and chemical stabilization have encountered difficulties in treating radioactive wastes in the DOE-complex. However, there is significantly more demonstrated experience in the commercial sector with the chemical stabilization technology than with the vitrification technology. In addition, based on evaluation of existing facilities, the production rate proposed for the vitrification process is at the limit of the current capacity of existing vitrification facilities treating radioactive material, while the production rate proposed for the chemical stabilization process is within limits of the current capacity of existing chemical stabilization facilities.

To treat Silos 1 and 2 material within a three-year time period, the vitrification process would have to produce 15 tons of vitrified material per day. Within the limited experience of the vitrification technology, there are no facilities in the DOE-complex and only two facilities in the commercial sector operating at the required capacity. This limited experience at the required capacity results in increased uncertainty as to whether the current technology has the capability to treat Silos 1 and 2 material at the required capacity. In comparison, to treat Silos 1 and 2 material within a three-year time period, the chemical stabilization process would have to process 12 cubic yards of Silos 1 and 2 material per day. There have been a number of chemical stabilization facilities in both the DOE-complex and the commercial sector that have operated at the required capacity. Because there is a greater degree of commercial demonstration of the chemical stabilization process at the required capacity, there is less uncertainty in its ability to treat Silos 1 and 2 at the required capacity.

Vitrification has more unit operations associated with it than chemical stabilization and is therefore considered to be more complex to operate than chemical stabilization. The integrated operation of complex systems associated with the vitrification process increases the likelihood of process upsets and resulting downtime. In addition, the complexity of process control associated with vitrification complicates melter operation. Included in the complexity of the process control are critical parameters that are not readily measured, such as viscosity, electrical conductivity, liquidus temperature, and sulfate formation. Furthermore, as stated under the discussion of short-term effectiveness, the hazards inherent to the vitrification process increase the risk to the worker during maintenance activities.

The two vitrification processes propose to operate 24-hours per day for seven days per week for three years. The two chemical stabilization processes propose to operate 16 to 24 hr/day for 5 days/week for three years. Based on the current designs, the chemical stabilization process has a better opportunity to improve schedule and accelerate remediation. In addition, based on current designs, the chemical stabilization has a better opportunity to recover from process upsets or other downtime.

Based on the above evaluation, chemical stabilization is the preferred alternative to implement. Chemical stabilization has a greater degree of commercial demonstration at the required capacity, is less complex to operate, and provides more opportunity to recover from process upsets and other downtime, as well as more opportunity to improve schedule.

Issue: X

Comment: The VIT1 evaluation should be reassessed to include an optimized container and associated changes such as fritting as favored by optimization. The VIT1 design approach submitted by Envitco relied on a qualified container design as described in the POP test report. This container design was utilized at the suggestion of Fluor Fernald, Inc., and Envitco understood that all technology providers would utilize this container.

Response: Packaging of treated Silos 1 and 2 material was evaluated for two reasons in the revised FS: 1) to determine impacts on cost from packaging, transportation, and disposal; and 2) to determine impacts on short-term risk to the public during transportation. Based on the evaluation presented in the revised FS, cost was determined not to be a discriminating factor in the selection of the treatment technology.

The selected container was an appropriate container to use as a basis for a CERCLA feasibility study. The container had been designed and tested to meet the requirements of a DOT 7A-Type A container. The container had also been designed to provide the shielding necessary to meet the DOT radiation level limits for shipping radioactive material. Although the container had been designed to be optimized for vitrified gems, based on the evaluation in the revised FS, the container would provide approximately an 80% packaging efficiency for vitrified monoliths in molds. All four proposed containers could be optimized further from what is presented in the revised FS. However, further optimization would not result in any modification to the conclusions presented in the revised FS or the revised PP.

Most of the POP vendors recognized that waste loading was a fundamental parameter, which affected shielding requirements and packaging efficiency. For the wasteforms with lower waste loadings (i.e., CHEM1, CHEM2), this effect was less. However, these alternatives produced three times the waste volume of the vitrification alternatives, and three times the shipments. Evaluation of risks to the public during transportation based on the four proposed container designs and wasteforms indicate that the treated waste can be shipped to the NTS with minimal risk to the public.

Further optimization of the four containers would not modify the conclusions that cost is not a discriminating factor and that vitrification is favored over chemical stabilization for the criterion of transportation risk.

Issue: Y

Comment: The cost data appearing in the revised FS for VIT1 was significantly different than that presented in the Public Workshop in November 1999. VIT1 costs increased by over 25%, primarily due to cost of money and operation and maintenance costs. This magnitude of change did not appear in the cost assessments for the other technologies. It was not obvious why this would differ for the different technologies.

Response: The cost information presented in the November 1999 public workshop was only a “snapshot” of work in progress. The cost estimates were finalized after incorporating independent review teams' comments in December 1999 and the entire revised FS was submitted to the EPA. The final revised FS cost estimates for all four alternatives include modified cost of money calculations and documented operational risk costs which account for the noted cost increase in the four alternatives.

The cost estimates are summarized in Volume 2 of the revised FS. The revised FS cost estimates are comprehensive and reflect the scope.

The conceptual designs and supporting cost estimates in the revised FS have been reviewed by independent technical review teams and cost experts. The cost estimates supporting the revised FS were found to be a fair and reasonable representation of the cost of performing these remediation projects at the FEMP under a regulated and DOE Radiological and Safety Programs. Project cost was not considered to be a discriminating factor between the VIT and CHEM alternatives, because the difference between the two technology families is 16% and the level of accuracy of the estimates is + 50/-30%.

Issue: Z

Comment: It was stated that the VIT1 alternative should be re-evaluated based on a 30 ton per day melter and the production of frit.

Response: It is DOE's position that the 15 tons per day melter design, proposed in the revised FS exceeded the known limit of the joule-heated vitrification technology's demonstrated capability on similar wastestreams to Silos 1 and 2 material by a factor of 3 (M-Area melter was 5 tons per day). A 30 tons per day would exceed the demonstrated capability by a factor of 6. DOE recognizes that joule-heated vitrification commercial glass plants routinely operate, at production rates in excess of 100 tons per day. However, full credit for this experience cannot be recognized since the commercial glassmaking feedstreams are very homogeneous to ensure quality control. DOE, Fluor Fernald, Inc., EPA, and OEPA did not elect to accept the increased risk associated with the higher capacity melters for use in treating heterogeneous radioactive or hazardous wastestreams, since none have been demonstrated at this time.

Issue: AA

Comment: A comment was issued regarding the representativeness of vitrification technologies evaluated in the revised FS. In particular, it was stated that the specific vitrification technologies evaluated are not representative of vitrification technologies that have been specifically developed for treating earthen materials such as the Silos 1 and 2 materials.

Response: The joule-heated vitrification technology evaluated in the revised FS and revised PP was the same representative technology evaluated in the FS and

PP and ultimately the technology selected as the treatment remedy in the OU4 ROD.

The revised FS and revised PP evaluated a wide range of representative vitrification technologies (i.e., cyclone, plasma arc, insitu) in order to develop a broader evaluation for the technology family.

In support of the revised FS, the POP Testing Program evaluated the range of technically representative vitrification technologies (joule-heated, cyclone, plasma arc and insitu) for pilot-scale testing. The data from the pilot-scale testing was used with other data, including Geosafe provided information to evaluate the vitrification technology in the revised FS and revised PP. The GeoMelt technology was determined to be a representative vitrification technology. However, through the POP competitive bid process, GeoMelt was not selected for POP testing.

Issue: BB

Comment: A comment was issued stating the ROD should be revised to include off-site treatment as an alternative.

Response: The off-site treatment option was evaluated as part of the screening of alternatives in Section 2 of the revised FS. A Commerce Business Daily announcement was published requesting responses from vendors expressing an interest in the off-site treatment of the Silos 1 and 2 material. Although a small number of expressions of interest were received, review of the documentation provided by the facilities indicated that none possessed both adequate current treatment capacity and adequate licensing. The lack of off-site commercial treatment facilities capable of accepting Silos 1 and 2 material, limits the involvement of the regulators, and the public in selection of an off-site treatment process during the post-ROD process and results in a significant risk in the ability to implement treatment in a timely manner. Therefore, off-site treatment has been excluded from further consideration as an alternative for the Silos 1 and 2 material.

Should an off-site treatment facility be identified during post-ROD remedial activities, the CERCLA process allows for the continued evaluation of a cleanup decision, as new information is identified.

Issue: CC

Comment: The basis for development of alternatives is said to have included "Commercial and DOE-complex experience..." It is obvious from the revised FS and the revised PP that this statement is not true relative to vitrification technologies. Geosafe has provided information on its GeoMelt vitrification technology to DOE and Fluor Fernald, Inc., several times; and it is apparent that this technology has been ignored by the studies. This technology has been used commercially on hazardous and radioactive waste more than any other vitrification technology.

Response: DOE did consider the GeoMelt system during the decision-making process and determined GeoMelt to be a representative vitrification technology. Although the GeoMelt system was not selected for POP testing, this did not preclude the GeoMelt system from being considered as a viable option should vitrification have been selected as the preferred remedy for Silos 1 and 2 material. As stated in Section 6 of the revised PP, under the discussion of each process option evaluated, "The treatment system described in this section is based upon data and other information compiled from POP testing and has been developed as a viable way to implement this alternative. Equivalent systems may exist and are not precluded from consideration, consistent with the final selected remedy, during remedial design."

In addition, DOE conducted a search identifying remedial sites across the U.S. and abroad where vitrification and chemical stabilization treatment technologies have been applied to the remediation of hazardous (lead contaminated) and/or radioactive material. Tables 3.1-2 through 3.1-5 of the revised FS presents a list of examples where the application of both vitrification and chemical stabilization technologies were applied to wastestreams that are reasonably similar to the Silos 1 and 2 material. The tables, as stated above, are a list of examples not an all-inclusive list of applications. Although not specifically listed in the tables, the information provided by Geosafe as part of its POP proposal was considered by DOE in the evaluation of vitrification.

Issue: DD

Comment: A concern was raised regarding the issuance of proper notice for the public hearing process and the perceived short response period regarding the public hearing.

Response: Per requirements in 40 CFR Section 300.430(f)(3)(i) of the NCP, the lead agency is required to publish a notice of availability and brief analysis of the PP in a major local newspaper. The NCP also allows the public a minimum of 30 calendar days to provide written and oral comments on the PP and material contained in the Administrative Record. In addition, the NCP requires a public meeting be held during the public comment period.

As the lead agency at the FEMP, the DOE, in accordance with NCP requirements, issued notices in major local newspapers both in the area surrounding the FEMP and the area surrounding the NTS. Notices were published in three newspapers surrounding the FEMP: the Harrison Press (March 29, 2000); the Hamilton Journal-News (March 30, 2000); and the Cincinnati Enquirer (April 2, 2000). Notices were published in two newspapers surrounding the NTS: the Pahrump Valley Times (March 31, 2000) and the Las Vegas Review-Journal (April 1, 2000). Copies of these notices are provided in **Attachment B.IV** of **Appendix B** of this ROD Amendment. The notices provide information of the time period for the public comment period, which ran from April 3 through May 18, 2000. In addition, the notices provided information regarding the location and date for the public hearing held in both respective areas (i.e., FEMP **S** April 25 and NTS **S** May 3).

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ATTACHMENT B.I

FLUOR DANIEL FERNALD

PUBLIC HEARING

PROPOSED PLAN FOR REMEDIAL ACTIONS AT
SILOS 1 AND 2

APRIL 25, 2000
6:30 P.M.

Alpha Building
10967 Hamilton-Cleves Highway
Harrison, Ohio

MR. STEGNER: Good evening everyone and thanks for coming. My name is Gary Stegner, I work in Public Affairs for the Department of Energy at Fernald.

The purpose of the meeting tonight is to conduct a formal public hearing on the revised proposed plan for Fernald's Operable Unit 4, which includes Silos 1 and 2, also known as K-65 silos. I want to emphasize that the scope of tonight's meeting is exclusively OU-4, and that is the subject we will be discussing for the duration of the meeting.

With me tonight are Nina Akgunduz. She's the Department of Energy's Project Manager for the silos project, and Terry Hagen, who is the Fluor Fernald Vice President for Site Closure.

I try to remind everybody to please sign the attendance roster, and if you have, I appreciate that. Also hope you've indicated whether or not you want to speak this evening during the formal public hearing portion of tonight. I want to emphasize that you do not have to speak tonight in order for your comments or questions to become part of the public record.

Written comments can be submitted this evening, they can be submitted anytime before the end of the comment period, which is May 18th. You can send those to me at the site or you can fax them to me at the site. My fax number is 648-3073.

We have scheduled two hours tonight to allow maximum time for questions and comments. We’ll take more time if necessary. Before we begin the formal public hearing, we will present a brief overview of the project, followed by a short informal question and answer session.

Also with us tonight we have Don Payne and Dennis Nixon, who will be able to answer questions during the informal question and answer period.

Prior to going into the formal public hearing, we will have a break. We will do that a little bit differently. Because this is a formal hearing, we do have a court reporter present. A copy of the transcript should be available in the Public Environmental Information Center within the next two weeks, more or less, and we will let you know when it’s in there through one of our mailings.

When we do receive your formal comments, they will be addressed in a formal responsiveness summary. That will be a part of, also part of the Record of Decision document.

You can't hear me? We're turning it up. I'll hold it closer. Is it okay now, Carol?

Is it okay now, folks? Better? Thanks, Carol. Sorry.

With that, let's now go into the overview portion of it. This will take probably -- We'll begin with the video, approximately 12 to 15 minutes. That will be followed by a presentation by Terry, and then an informal question and answer session, and following that we will take a break and proceed to the formal public hearing. So with that, Terry.

(Playing of video.)

MR. STEGNER: This video was produced at the request of stakeholders from Nevada to really present a very succinct overview of the project for their stakeholders.

Following Terry's presentation, we will go into an informal question and answer session. Once we go into the formal public comment slot this evening, we will not be responding at that time. We will simply be in a listening and recording mode then. So if you have questions, please raise them during the informal question and comment period.

We would ask that, in the interest of time, hold your questions until Terry’s presentation is completed, and we will respond to all during the informal question and comment period. Terry.

MR.HAGEN: What I’d like to do is summarize the information that was presented in the video and in some instances supplement it with some additional detail against the evaluation criteria that CERCLA requires us to use when we evaluate and select remedies. For those of you who have been with us through this long process, this is going to in essence be a repeat of what we talked about the last time we were together.

The CERCLA decision-making criteria are called the nine criteria, and you see them here. They’re broken up into three categories. The first two are called threshold criteria, and what that means is by EPA promulgated regulation you cannot select a remedy that does not meet adequately these two threshold criteria, the first two on the overhead, overall protection of human health and the environment and compliance with applicable or relevant and appropriate requirements. If a potential alternative is demonstrated to meet those threshold criteria, then it’s eligible for further evaluation against what are called the balancing criteria. That’s the next five.

What you are looking for is a qualitative assessment of the trade-offs among those. There’s nothing in the guidance that says among these next five balancing criteria one is more important than the other, nor does the guidance tell you how to develop a site specific weighting. It’s really dependent upon very site specific circumstances, and it’s the job of the responsible party, the stakeholders, and EPA to make those qualitative judgments as to what’s the best balance of trade-offs among these five.

Finally, the last two, state acceptance and community acceptance, are called modifying criteria, and where those come in formally, although we have done our best to consider those things to date in developing and presenting the preferred alternative, where those come in formally is as a result of this process where there's a formal public comment period, stakeholders have the opportunity to have their say on what DOE and the regulators have proposed as the remedy, and DOE, as the responsible party, is obligated to consider those comments, make a change in the remedy, if warranted, based on those comments, or at a minimum respond in a responsiveness summary, which becomes part of the Record of Decision to each and every one of those. Since this process isn't done, obviously we don't have any kind of presentation tonight on those.

Let me talk briefly about the two threshold criteria, which you'll see are neutral, which means that it was our assessment that both of the technology families, vitrification and chemical stabilization, did indeed meet the threshold criteria, are eligible for selection under CERCLA, and hence went forward for a more detailed review of how the balancing criteria played out.

What's the basis for saying both

alternatives meet the threshold criteria starting with overall protection of human health and the environment? First, from a Fernald perspective, all of the materials that are contaminated with metals and radiological contaminants above health based levels are taken up, taken out of the silos, treated and sent in a safe configuration to the Nevada Test Site for disposal. So from the Fernald perspective, we're taking the contamination up and getting it out of here.

From the perspective of transportation, which we talk about again later, we did calculations as to what risks would be associated with incident-free transportation, in other words, everything went great, no problems. We also did evaluations of what risk would be presented in an accident scenario, what if something went wrong, and both alternatives, although there are differences which we'll come to here in a little bit, both were well within the CERCLA range of acceptable risk.

And then, finally, disposal at the Nevada Test Site, long-term protection is provided there by, number one, the treatment, which immobilizes the lead, the primary contaminant of concern for the purpose of treatment; the combination of the treatment containerization and disposal at depth mitigates radon attenuation, which is the other significant contaminant of concern, and that combined with the isolated location and access controls that go along with the Nevada Test Site provide for the protection there. And here in a minute when we get into the balancing criteria, the first one is long-term effectiveness and permanence, and as you saw on the slide that I just had, we rated those neutral, both performing approximately the same. The arguments that I just presented apply there as well. That’s also the basis under that criterion for rating them as providing equal and adequate long-term protection.

Compliance with ARARs, which are applicable or relevant and appropriate requirements, another threshold, again our assessment has concluded that both alternatives adequately satisfy all ARARs. Most notably is the NESHAP Subpart Q radon flux limit, which is met adequately for both alternatives, and we’ll talk about radon attenuation here again in a few moments. The treatment under vitrification adequately provides radon attenuation, a combination of packaging and disposal. The whole alternative provides compliance with that ARAR for stabilization.

As far as all transportation requirements, Department of Transportation requirements, those will be met. Our analysis indicates that they can be met. And as far as siting requirements, engineering, other action specific requirements, again the consensus was that both alternatives could meet all identified ARARs, which means that both alternative families, both technology families, vitrification and chemical stabilization, are acceptable for further evaluation against the balancing criteria. I just talked about this.

And again the same argument that both alternatives adequately protect human health and the environment also apply in our evaluation of long-term effectiveness and permanence. We get it out of here, treat the materials such that the lead is immobilized, and get it into the ground in a stable disposal configuration in an arid, remote environment with access controls to minimize any kind of long-term environmental impact.

Now, of the five balancing criteria, it was our assessment, and let me define who “our,” when I say “our,” who I’m talking about. Certainly DOE, working with both US and Ohio EPA, as well as receiving input from the Department of Energy Independent Review Team and the Critical Analysis Team, basically felt that there were three primary discriminators, and subsequent interface with the stakeholders, especially with FRESH and the CAB, I think tended to validate that, that, as we just talked about, long-term effectiveness and permanence was neutral.

We’ll get to cost, which is important but not substantially different among the alternatives, so there was really nothing there that said there’s a basis for selecting one over another.

We did see what we felt were meaningful differences between the two technologies in the next three balancing criteria that I’m going to talk about. The first one is reduction of toxicity, mobility, or volume through treatment.

The overall conclusion of the groups that I referenced earlier is that there is a clear advantage in this criteria for vitrification, and it’s primarily related to the treated waste volume, and I’ll reference where the arrows fall here in a little bit.

But to move on, roughly because of the nature of the process, the treated volume and then the packaged volume and the amount of material on the road and going into the ground in Nevada is roughly three times greater for the chemical stabilization technologies than the two representative vitrification technologies. And that’s primarily because as part of chemical stabilization you add things, additives, chemical additives that achieve the chemical immobilization process, coming along with it a fairly significant volume increase.

Vitrification, by the nature of that technology, actually reduces the volume. So this right here is the bottom line for why we felt there was a clear advantage to the vitrification technology family on the overall criterion of reduction of toxicity, mobility, and volume through treatment.

A couple of other things were evaluated, the first one being secondary waste generation. We're showing an advantage to chemical stabilization for that. However, it's not significant, not a discriminator, not something that undoes or overrides or even erodes the significant advantage of vitrification relative to the treated volume. You can see they're about the same.

Our assessment is that the actual secondary waste produced by vitrification are going to be a little harder to deal with, we'll probably have some mixed waste associated with the refractory brick, and because of the high temperature aspect of the operation, some of the off-gases are expected to be a little bit more difficult to deal with. For instance, we're going to fully liberate the radon that is contained in these wastes, whereas that won't be the case with chemical stabilization, but not a significant discriminator.

Reduction in mobility of COCs, let me just say quickly we rated that as neutral, the reason being is that testing data that came back from our proof of principle testing for both technology families with all four representative technologies adequately treated the lead, the RCRA metals, which is the primary treatment objective.

The second contaminant of concern that we’re looking at in evaluating what treatment does in relationship to is radon. There is a significant advantage for the vitrification technology for reduction of radon emanation. If you look at the results of our proof of principle testing, basically what that showed is, I referenced earlier the NESHAP, Subpart Q ARAR for radon flux, the treatment through vitrification alone achieves that ARAR. For chemical stabilization, while there is a reduction of radon attenuation through treatment, to achieve that ARAR, we got to do it through a combination of treatment and packaging. So there was an advantage there for vitrification, which again promoted the overall conclusion of reduction of toxicity, mobility, and volume through treatment in favor of vitrification.

The second discriminating balancing

criteria is called short-term effectiveness, in which we have judged there to be an advantage to chemical stabilization, broken up in several parts. The first one is worker risk, and to summarize some things you heard on the video, the radiological dose that we calculated for on-site workers is about the same. That's not the differentiator here. A little later in the package on implementability I'm going to show a graphic that shows number of hours worked, and what you're going to see is roughly it takes, our current estimate is about 16,000 work hours to implement vitrification, whereas, depending on which representative technology of chemical stabilization, there's going to be anywhere from 7,000 to 10,000. So there's a reduced number of operating hours, which statistically translates to a lower probability of some kind of accident during operation.

The second thing has to do with worker risk in an upset mode, in which something goes wrong and we've got to go in under let's say nonroutine circumstances and do something about it. As you recall, these are going to be remote technologies. Maintenance, however, is direct contact. Because of the high temperature, high voltage operation, we think there are greater risks for workers associated with maintenance and upset conditions for the vitrification technology. So that’s the worker risk aspect of this.

The second aspect of short-term effectiveness is transportation risk, where we judge there to be an advantage for vitrification, and it links back to the exact same piece of data that I gave for reduction of toxicity, mobility, and volume. There’s about a third less volume of material for vitrification that has to be shipped over the highways. That directly results in about a third of the statistical chance of some kind of accident happening. So, therefore, we judge there to be an advantage in this for vitrification.

A couple of others notes, neither of which undoes the conclusion that I just said, is that the calculated transportation risk for both technologies, including in an accident scenario, were within the CERCLA guidelines, I mentioned that up front, for overall protection of human health and the environment. And, second, one of the things that was of interest to our stakeholders in Nevada is that because with vitrification you are essentially consolidating that waste -- consolidation isn't the right word -- concentrating that waste, I'm sorry, the radioactivity associated with the treated material isn't going away, it actually becomes more concentrated. So the dose associated with the treated material is actually higher in chemical stabilization because in effect you're diluting it by adding those additives. So in the event, which we think is the unlikely event, of some kind of an accident scenario where it would come out of the container, out of the packaging, it would be -- it would represent a higher risk to response workers because of that higher dose radon contact.

Off-site environmental impacts were judged to be neutral. And we do recognize that there's a higher volume for the chemical stabilization materials, but the basis of that statement is that it's going into a highly impacted area that has been designated for disposal of this type of material. Hence, approximately neutral. There's no meaningful difference in the long-term impact between the two at the Nevada Test Site.

Finally, time to achieve protectiveness, based on the data that came back from the proof of principle testing, there was roughly, I think it was about ten months, as I recall, an advantage to chemical stabilization on the up front design, construction, and start-up that allowed that technology to finish sooner. That’s a fairly slight difference, but there was a perceived advantage for chemical stabilization there.

The third discriminating criteria of the balancing criteria is implementability, where we have judged there to be an advantage to chemical stabilization. Let me go back and repeat something that the video said. Implementing any of these technologies is going to be a challenge. They’ve all got their unique aspects that are not going to be easy. Chemical stabilization, for instance, done in a remote environment is not going to be easy. That’s the input that we received from our independent reviewers, to a lesser extent our vendors, and that we recognized ourselves. So I don’t want anybody to leave with the impression that we’re suggesting that it’s a slam dunk for chemical stabilization because we’re suggesting there’s an advantage. Just that when compared against vitrification, it does appear to be more implementable.

What’s the basis of that, scaleup neutral? Why are we declaring that neutral? Because for the vitrification technologies, there are instances where there have been applied commercially, not in a radioactive environment, but where there have been applied commercially at a scale actually greater than what we think we need here to get the job done in a timely fashion and numerous instances where chemical stabilization has been applied at a scale that we require here. But since we did find in the real world applications of vitrification where it had been done at the scale, it was rated as neutral.

Commercial demonstration, and we have judged there to be an advantage for chemical stabilization there. As we’ve talked about in past meetings, what we did was is did a survey of the DOE complex, actually extended that to radioactive waste treatment worldwide, and then also looked across the range of SuperFund Records of Decisions, corrective actions under RCRA, and to a lesser extent remedial actions overseen by the Nuclear Regulatory Commission. There were a dramatically larger number of instances to where chemical stabilization had been applied. And a relatively small, and in some instances no applications of the vitrification technologies at the scale that we need in a radioactive environment.

Now, let me go back and repeat what I said at the outset. There are a couple of famous failures of chemical stabilization at the DOE complex that people know about. This is not suggesting that it’s a slam dunk. It’s simply saying that when reviewed by literature, going through the DOE complex, et cetera, there are a lot more instances to where chemical stabilization has been applied, applied in similar circumstances successfully, which is something that the EPA guidance does ask us to look at and does judge to be a meaningful decision-making input.

Operability is again a subcomponent of implementability that we judged there to be an advantage for chemical stabilization. Put simply, if you look at the unit operations associated with chemical stabilization versus vitrification, there are fewer of them, and that it is our judgment, again looking with DOE, the regulators, with input from our vendors and independent review teams, that they are generally more easy to control. And in addition, there being fewer of them, that in a nutshell is really the quantifiable basis for saying that we think that chemical stabilization technologies will be more readily implementable based on the operability criteria.

Something that we also mentioned earlier is that while implementing these technologies will be remote for standard operations, in an upset condition or for routine maintenance, that's going to be direct contact where actually we have to send workers in there, and we think because of the high temperature, high voltage aspects of vitrification, it's going to be more difficult to do in a safe, timely fashion whatever we need to do to recover from an upset or the routine maintenance on these things.

To kind of back that up, so to speak, I had mentioned earlier that there's a significantly larger number of operating hours required to implement remediation if we use vitrification versus stabilization, and I quoted a couple of numbers. To bring that back to this particular evaluation technology, the message here is that the more these things run with more unit operations, the more hours, the more time that these things have to go, it’s our experience and we believe the experience of the DOE complex and industry in general of these technologies that more things happen. That’s kind of common sense based on any operation that we work with, the longer the operation takes, the more likelihood that you will encounter some kind of maintenance issues, some kind of operability issue.

The last balancing criteria is cost. I mentioned at the outset that we did not view this as discriminating, costs. That’s not to say that cost effectiveness is not important. In fact, it’s a statutory requirement that DOE only select, the EPA only select remedies that are cost effective. We’re not saying that it’s unimportant. What we’re saying is that when we did the cost estimating based on the data that we had from industry, the

DOE complex, and our proof of principle testing, there was only about a 15, 16 percent difference. Within the range of accuracy of this stage of the CERCLA process, which is plus 50 percent minus 30, it was judged that that’s just not a meaningful difference. So it wasn’t a discriminator in this decision-making process. It is generally -- in fact, it is statutorily required that the remedy be demonstrated to be cost effective.

This is a brief summary of what you saw on the video with a little bit of information. The reason we did it is because these are the criteria that we’re obligated to use under CERCLA guidance, under EPA guidance to make decisions. Hopefully it’s nothing really new. I believe it matches directly what we’ve talked about in the past.

That does conclude the presentation that I’ve got. I think we’re ready for Q&A, Gary.

MR. STEGNER: I want to emphasize that if you have questions that you want responded to, now is the time to ask those questions. If you’ve not received an answer to your question so far tonight or in a previous meeting and you want clarification on a matter, please raise those questions now. Again, we will not be responding to questions during the formal comment period. JoAnne.

MS. WILSON: My name is JoAnne Wilson, and I live in Fairfield, Ohio. Can you tell us how long it is going to take to develop, build the containment buildings that will surround the silos that you'll use for either one of the passages? What time frame are we looking at, and is the money already funded for this part?

MR. STEGNER: Yes, we can answer that, JoAnne.

MR. HAGEN: We're pulling out a slide right now to try to answer that question. I'm not sure if this is what she asked, by the way.

For the alternatives that are being considered in the FS, this is a breakdown of how long we have estimated at this point in time, using the data that's come back from the proof of principle testing and also our review of application of these technologies from around the complex, you see roughly about 120 months.

What this breaks down, the first -- just to take these in order -- the first block of time is how long we estimate that it will take to design the treatment technology fully, incorporating public involvement and regulatory review and approval. Then we move on to construction. That roughly takes a little over a year and a half for that design process. Moving on to construction, a similar amount of time, about a year and a half. The next stage is once the system is constructed, we don’t go to operation until we fully shake down, is my term, until we’ve demonstrated that we know exactly how to operate this thing right, safely, and efficiently. And then the next stage is actual operations. Right now we’re showing that as three years. Our input from vendors from both families is that if we’ve got adequate funding, we can do it faster, either by upping the capacity of the unit operations as we’ve assumed in the FS or by adding additional processing capability. The last parts of the process are a little bit of contingency for uncertainty, you know, everything doesn’t always go great, so we’ve added some contingencies with scheduling. And, finally, safe shutdown of the facilities and disposal goes in a safe manner.

Where the difference is, you know, it’s a few months here and there, but primarily there was about five or six months advantage to the chemical stabilization technologies in the start-up phase and then a few months here and there, adding up to about a year of estimated schedule advantage for the chemical stabilization alternatives.

Now, that’s the answer relative to the alternatives that are under consideration for treatment. I had interpreted your question to be related to our advanced waste retrieval project in taking it out of the existing silos and putting it into a safe, homogenized configuration which facilitates treatment and also improves upon the stability of the storage configuration over what’s in the silos. So in case I interpreted that right, Dennis, do you want to give a brief update on where we’re at on that.

MR. NIXON: Yes. The state of the art project is currently in design. The operations are scheduled to begin March of 2001, and that would complete in June of ‘02. So there would be, that project would be completed by June of ‘02.

MS. WILSON: Of ‘02?

MR. NIXON: Yes.

MS. WILSON: That personally answers my question, but I guess what I’m really trying to get at from you is, there is going to be a containment building of some nature built over the silos sites; is that not correct?

MR. NIXON: No, that’s not.

MS. WILSON: Well, the last time when we had our meeting in November there was a concern over when you opened up the silos, and I believe you stated at that time that there would be some type of, and I call it a containment building, you perhaps have another word for it, which would go over the site so that when the silos are opened and the escaping gases, et cetera, would be collected, and I believe you showed several slides showing how the air would be sucked up and treated. So those buildings that -- First of all, what do you -- I’m assuming they would be the same for either project since you would have to open the silos for either.

MS. AKGUNDUZ: I’ll take that,

JoAnne. What you are referring to is the auxiliary waste retrieval project we have. The structure that you saw from the past meeting is probably the gantry type of thing that's built over the silos to facilitate the deploying the retrieval equipment through the hole top of the silo. Now, in order to retrieve the material, we do have to have a radon control system in operations. The radon control system building is not on top of the silo. It's adjacent to the tanks that we're going to be building that the material is going to be transferred into.

MS. WILSON: So there will be actually nothing over either of the silos?

MS. AKGUNDUZ: Only the equipment room and the structure that is going to support the equipment room.

MR. SCHNEIDER: There's a containment structure around the breach -- I think your question, the answer to your question is, yes, there is a containment structure over the breach in the silos.

MS. WILSON: That's what I thought from the last meeting that there was going to be that, and that is already scheduled, you said it's already being worked on?

MR. NIXON: Right, it's being done right now.

MS. AKGUNDUZ: March 2001 is when the radon control system will be starting to operate. It won't be the time -- when we actually start retrieving the waste out of the silos will be in the year 2002.

MS. WILSON: But you have plans for some type of -- I still say a building, whether it's here or there -- and then along with that process, then, you have also scheduled or are designing or have designed the specialized storage barrels, containers --

MR. SCHNEIDER: Tanks.

MS. WILSON: -- That the material from the silos will go into as a precautionary measure and will wait there until the other material process is chosen to process that; is that correct?

MS. AKGUNDUZ: That's correct.

MS. WILSON: And these are already funded?

MS. AKGUNDUZ: We are -- The way the funds, the funding works is that we are annually funded. Now, these are budgeted; all the scope is budgeted.

MS. WILSON: They're in the budget?

MS. AKGUNDUZ: Yes, they're in the budget.

MS. WILSON: That's probably the word then. And you anticipate the containment affair and the containers would be available then or would be ready to go by 2002, is that your --

MS. AKGUNDUZ: Yes. Material will be, yes, it will be starting, we will be starting to retrieve the material out of the silos in 2002.

MS. WILSON: Is there any difference in these things for either of the methods that are going to be used?

MS. AKGUNDUZ: No.

MS. WILSON: Thank you.

MR. STEGNER: Pam and then Edwa.

MS. DUNN: I just have a couple of quick questions. On your cost comparison, Gary, is transportation part of the waste disposal cost or is transportation cost not reflected in this?

MR. HAGEN: It’s part of the transportation disposal costs, right?

UNIDENTIFIED SPEAKER: Yes.

MR. HAGEN: The answer is yes, it is incorporated into the total cost, and it’s reflected into the disposal cost estimate.

MS. DUNN: Is also the cost to dispose it that you have to pay the test site part of that number too, or is that mostly transportation?

UNIDENTIFIED SPEAKER: Most of that is transportation, most of the disposal cost is transportation.

MR. HAGEN: It does include the tip entry at the site as well.

MS. DUNN: On the alternatives or your implementability where you talk about your commercial, did you look at commercial uses outside of the US as well as within?

MR. HAGEN: Yes.

MS. DUNN: There is some success for it outside the US?

MR. HAGEN: Yes, we did. And that’s also within -- As an appendix to the FS, we present the results of that survey, and it does specifically mention which international applications we found -- well, we focused on it internationally, but we do include every instance to where we applied it internationally, and that's an attachment, an appendix to the FS.

MS. YOCUM: I just need some clarification. On chemical stabilization CHEM1, is there a wastewater treatment included in that also? I see it mentioned only in CHEM2.

MR. NIXON: Yes, they both have treatment prior to transfer.

MS. YOCUM: Okay, then why isn't one mentioned in CHEM1? I mean, it would be easier than me having to ask the question over and over.

MR. NIXON: Right. The vendor in the proof of principle testing felt that they could treat the wastewater at the pump filter press would be clean enough to meet the advance wastewater treatment facility acceptance criteria. But if it doesn't -- that's in the text of the document -- it's stated if they can't meet that, then a wastewater treatment plant would be provided. It was not required for this, for that treatment technology because they were able to demonstrate that in their testing.

MR. HAGEN: One of the things that we will do during the design phase is require additional testing to document conclusively that they meet it or they can't.

MS. YOCUM: That was going to be my next question, how are you going to make sure you can meet that?

MR. NIXON: We're going to give them the future contract, and they will have a very strict waste acceptance criteria for a wastewater treatment facility that they will have to meet. As I said, in this case the vendor was able to meet the criteria without further treatment, but if that's not the case, then they would have to comply with that.

MS. CRAWFORD: Do the costs over and above that, are those reflected in your cost estimates if they have to go forward and use the wastewater treatment facility?

MR. HAGEN: No.

MS. CRAWFORD: I think you should go back and add that number in because if that's the case, if you're using wastewater in CHEM2 and probably 1, if they can't meet the WAC, then common sense would tell us the cost estimates are not correct if you've not factored in the extra costs for the wastewater treatment facility. Which is going to probably bring them neck and neck.

MR. NIXON: Well, I can't -- it's difficult to address that. We have what we call operational risk dollars in the cost estimates that is for things of that nature. In the event that the vendor proposal would include wastewater treatment because of the process they are providing, then that would be covered under operational risk at that time. There was about a 16 percent difference, between CHEM and VIT, which is a fairly significant number in a wastewater treatment plan of this kind. It would be relatively inexpensive.

MR. HAGEN: These guys always love it when I make these commitments for them, but one thing we can do in the responsiveness summary is do a specific evaluation and document how many dollars would go along with adding a treatment facility, number one, and then make a conclusion as to whether it changes the fundamental evaluation, which is that it's an important but not a discriminating decision-making factor. So we can do that.

MS. CRAWFORD: We ask for those things because too many times, as you all well know, we get down the pike and all of a sudden it's like, oh, well, we forgot this and we need to add that, and it,'s a little more money here and a little more money there, and then in the long run you haven't saved a whole hell of a lot of money. So I would encourage you to do that.

MR. HAGEN: Okay.

MR. STEGNER: Sir.

MR. DAVIS: I'm Doug Davis from Toledo Engineering. When these materials, treated materials arrive at NTS, what is the time period which you estimate they will require the attention and the maintenance of this test site?

MR. HAGEN: Let me answer it this way: One of the things that we've got to do to be able to get these materials in to the ground for permanent disposal at the test site is pass a performance assessment. The life assumed, the life of disposal assumed in that assessment is 10,000 years. So we've got to have a quantitative demonstration that this will remain -- this alternative, if implemented, with either waste form going into the ground at Nevada will remain its protectiveness for at least 10,000 years, and that really, I think it starts to drive some of the -- What that means is that direct intrusion scenarios tend to drive that risk assessment, but we have been working with the Nevada Test Site and have information from them based on specific evaluation of the untreated waste form for starters, and then secondly what our current estimates of what the characteristics of the treated waste form would be, and both would meet the performance assessment requirements based on a 10,000 year life evaluation.

MS. WILSON: What I was asking before, how long do you estimate that the materials, the silo materials will remain in the special containers before either one of the treatments begin?

MR. NIXON: Treatment is scheduled to begin in June of '06 for this process. That's our current based on schedule.

MS. WILSON: For either one?

MR. NIXON: That's correct, for either technology.

MS. WILSON: The building will be in place and it will already be operational by '06?

MR. NIXON: Right.

MS. WILSON: And these containers are -- will be especially built to hold the residue as it now is?

MR. NIXON: They're actually tanks. They're steel tanks, and there's shielding, there's a containment around those tanks of concrete.

MS. WILSON: A concrete protection?

MR. NIXON: Right.

MR. STEGNER: Edwa.

MS. YOCUM: I have one more. This is always a concern to me, is if NTS closes the gates, what happens to this waste, the silo waste, where will it be disposed?

MR. HAGEN: That's not an easy question to answer. The one thing, though, that is clear if you look across the Records of Decision for Fernald, it can't go here. It's not even close to meeting the waste acceptance criteria for an on-site disposal facility. So while I don't have a good answer for you, there's nothing that we've agreed to together that says it can go to Fernald.

MR. STEGNER: Okay. Let's take a short break.

MR. HAGEN: There's another question.

MR. STEGNER: I'm sorry, go ahead.

MR. DAVIS: This will be a very short one. With the materials going to NTS, when the consideration was being made for high level radioactive waste, and I know the materials are significantly different, but the part of the scenario was always the "what if" game played out formally which said, let us assume that the infrastructure to maintain this is gone, and for 10,000 years that may be a reasonable assumption, and so for these materials it was always driven very strongly toward the most durable treatment, you know, not depending on the container. So I was curious if this kind of consideration came up in your discussion?

MR. BECKMAN: As part of the PA

process, we look at inadvertent scenarios, what happens if somebody built a form on top of a waste cell and sinks its well through the disposal. The container brings the stuff up to the surface and eats it.

MR. HAGEN: And they also considered the untreated waste form, right, Steve?

MR. BECKMAN: Right. They don’t take credit for the waste form.

MR. STEGNER: Jerry.

MR. GELS: I had a question about the comparative analysis summary. Is the analysis of the treatment technology or the combination of the treatment technology and the burial or ultimate disposal together?

MR. BECKMAN: It’s together.

MR. HAGEN: It’s together, right.

MR. GELS: It’s together, that’s what I assumed. So, if you wanted to increase your number, you just bury it deeper or in a drier location? That may be -- we’re looking at the NTS.

MR. HAGEN: Yes. Particularly as it relates to the radon flux. The depth of burial is an issue there and, yes, it’s one of the ways to address that issue. But it does include the entire combination of treatment and disposal.

MR. GELS: Okay. one question I had then was with your long-term evaluation for effectiveness and permanence. The neutral decision goes against everything I've heard before about vitrification versus a cement kind of a product, especially as you point out that 10,000 year scenario, we're talking about -- I don't know of any -- I mean, we found glass materials near volcanoes that have lasted that long, yes, but I've never seen anything that has shown that a cement or concrete product can last 10,000 years.

MR. HAGEN: A couple of things. One is that for chemical stabilization, the immobilization of the lead is not through a physical form like you see in concrete blocks in the building down the road. It's actually the chemical reaction that takes place between the pozzolan type additive and the lead itself. In fact, the test that EPA requires to demonstrate, called TCLP, I forget what the letters stand for, actually grinds the material up, the vitrified material, the stabilized material, chemically stabilized material. So the physical form of the waste is not really what drives the protectiveness, particularly for chemical stabilization, that chemical reaction. So that's the first thing. If there is degradation of the physical consolidated waste form, it doesn't mean that you're losing the immobilization contamination.

Secondly, and, you know, this is a statement that we always say respectfully and carefully in Nevada, but given where it is, it is going in fact into a hole created by an explosion of a nuclear weapon, and with the background and other contamination that is in place, the meaningful difference between what we're putting there compared to what is already there and the degree of impact to the environment is just not, in our mind, this is our conclusion, not forcing it on anybody else, especially the citizens of Nevada, but it's just not a meaningful difference. And, by the way, we haven't gotten, you know, that's generally been accepted by the people in Nevada. So that's why we say it's neutral.

Is there some basis for saying they're different? Yes. Is it a meaningful difference in our mind considering that they both achieve the remedial action objective and that the protection for that achievement of the remedial action objective isn't dependent on the physical form of the waste, it's the chemical processes that take place. We don't think there's enough of a difference to say there's an advantage in one direction or another. That's the basis of us calling it neutral.

MR. GELS: I don't necessarily disagree with you on the basis of lead and radon, but you've not mentioned radium in this. Was that evaluated, radium 226 as part of the leachate, leachability?

MR. HAGEN: Yeah, it was evaluated. It was not judged to be -- It is a contaminant of concern, yes, requiring, you know, us to do something from a risk assessment perspective. If you look at what drove the requirement for treatment, that was not a contaminant that required treatment. It was actually just the lead. The second -- and I'm talking from a regulatory perspective. Different stakeholders can have different perceptions, and we respect that, but from a regulatory perspective, the only thing that drove the treatment was the lead and the fact that it is present at leachable concentrations above the RCRA thresholds. That's why we focused on lead and radon, because they both have ARARs that tend to drive the acceptability of disposal as opposed to radium.

MR. BECKMAN: But that's looked at in the PA.

MR. STEGNER: Sir, you had a question?

UNIDENTIFIED SPEAKER: I'm trying to determine which is better, is CHEM1 better than CHEM2 or vice versa?

MR. HAGEN: Well, what we're going to do if ultimately chemical stabilization is selected is not specify any one iteration of chemical stabilization. What we're going to do is require that the successful offeror provide a technology that uses chemical stabilization, but then let the competitive market give us the best version as it applies for these specific wastes. We're not really trying to say that we know enough that one iteration is better.

The reason is because we selected two representative technologies. There are 20 or 30 other different ways to do it out there, and we don’t want to make the conclusion that one is better than B because it might produce a false path forward. Okay. We want the best application of chemical stabilization possible out there, the most timely and to a lesser extent cost effective application to come out of a competitive process. That’s why we’ve stayed away from conclusions like which of the two representative technologies are better.

UNIDENTIFIED SPEAKER: Well, it looks like vitrification is dead from everything that I’ve read, and we just ought to forget about that and concentrate now on the chemical stabilization.

MR. HAGEN: Well, we propose chemical.

UNIDENTIFIED SPEAKER: We still don’t know which chemical stabilization is better. So it sounds like you really haven’t done your job at this point.

MR. HAGEN: Let me go back and say

what I’ve just said again, and that is that, well, first, we are proposing chemical stabilization as the technology family. It doesn’t mean vitrification is dead, that’s why we’re here tonight, to get public input. Let’s just suppose hypothetically that we do go forward with chemical stabilization. What we’re saying is that there are a lot of different ways to implement chemical stabilization that are consistent with the way we define the technology and what a successful vendor would have to offer. We don’t want to get into the situation to where we artificially limit the best way to do it by only comparing two or three or four vendors. We want to let the competitive market with people that have demonstrated success with their particular version of the technology come and give us the best application. So we want to stay away from that.

UNIDENTIFIED SPEAKER: Okay. We’re still in the very early process then of selecting the best method?

MR. HAGEN: The final vendor.

UNIDENTIFIED SPEAKER: Okay. Reading this material here it looks like you’ve done the survey, you know, and you've decided on CHEM1 or CHEM2 and you know exactly what goes into that, one has fly ash and the other one doesn't, and so forth and so on, but you may go to something completely different from what you've got here?

MR.HAGEN: Not completely different. It still has to fundamentally be a chemical stabilization technology where you've got to immobilize the lead to RCRA standards using a chemical process that achieves that reduction in mobility through that chemical reaction. So it's not just anything; it's got to be within that technology family, and again, I know I'm repeating myself, what we want is the best application that's available out there in the competitive market from vendors that have demonstrated the ability to do it right.

UNIDENTIFIED SPEAKER: Okay. So in this comment period what are the citizens supposed to do? You haven't really decided the best method yet. What are the citizens supposed to say, vitrification, we don't want that, we want CHEM1 and CHEM2, but of the CHEM1 and CHEM2, we don't know what the best solution is?

MR. HAGEN: We’re not attempting, I apologize, I know I’m not being clear, we’re not attempting to make a decision or ask you to decide between CHEM1 and CHEM2. We’re asking you to give whatever input you want to give, including if you think we have more work to do, tell us that, but what we are specifically asking right now is based on the comparative analysis, that the family of vitrification compared to the family of chemical stabilization, we are proposing chemical stabilization. We want to know what you think of that. I’m not going to tell you how to comment. If you think that there needs to be more public involvement, which there will be, in how we get to the final answer, if you’ve got particular thoughts on how that public involvement should be structured, what decision points based on what data you want, please comment. But first and foremost, we’re asking people to react to our proposal to select some application of chemical stabilization family.

UNIDENTIFIED SPEAKER: I see, okay, as opposed to vitrification.

MR. HAGEN: Yes.

MR. STEGNER: We'll take two more, you and you.

UNIDENTIFIED SPEAKER: I was going to point out for Jerry, he talked about a city in which the volcanic glass being nationally available and have had long age, cementatious rocks are the same. There's all kind of cementatious rocks, including limestone and sandstones, that have been around for millions of years. So I think you can make that same comparison that way.

The other thing, Terry, you guys have also looked at the radioactive decay of this material. I know lead was the driving factor, but in terms of where it's going into the Nevada Test. Site, I think from a radioactive standpoint, due to the decay, you don't need 10,000 years to protect this material, do you?

UNIDENTIFIED SPEAKER: Sure do. It's there for the term.

MR. SCHNEIDER: It's not going to get any less radioactive.

UNIDENTIFIED SPEAKER: In 10,000 years you'll have six half lives of radium 226, so it should decrease, total activity of the radium should decrease by 1/60th.

MR. GELS: More than that.

MR. STEGNER: JoAnne.

MS. WILSON: This brings up a point that the gentleman brought up here, when you were preparing the plans for either method, I believe you said that you consulted with various companies that were both familiar with and competent, appeared to be competent in handling this. Was it from these people -- Was it from these people that you got the general plan for each one of these?

MR. HAGEN: The answer is generically, yes. We mentioned that we conducted proof of principle tests using two representative applications of each technology family. We went out competitively and procured the services of four different companies to go do 72-hour test run for each of the technologies. That is the primary basis of the data that we used to develop the alternatives in the FS. That was not the exclusive basis.

We also went to other places where it’s been done in the DOE complex, talked to them. Did literature reviews, and also used some of our own experience at Fernald because we have successfully implemented chemical stabilization, on a smaller scale, and we've also gotten experience through the melter, for better or for worse, with vitrification. But having said that, we didn't bias anything with our experience. The primary basis of information was the data from the proof of principles testing.

MS. WILSON: Would these same companies then be considered as possible vendors?

MR. HAGEN: The answer is that any vendor, let's suppose hypothetically it's chemical stabilization, any vendor that can demonstrate qualifications with that particular technology will have an opportunity to bid on the final job. Conversely, if for some reason it changes to vitrification, the same thing applies. Any company that can demonstrate capabilities with that technology will have the opportunity to propose.

MS. WILSON: But I think you also then said that when you chose a vendor, it could quite possibly be up to that vendor to decide how they were going to process material, and it could be a third, fourth or fifth version of say the chemical stabilization.

MR. HAGEN: All within the general, all within the general family, which, a dramatic oversimplification, means you take the material, you add some kind of pozzolanic agent, sometimes it's as simple as a cement derivative, sometimes there are companies that have their own proprietary twist, but in all instances it is the addition of some chemical agent that causes a chemical reaction with your constituents of concern to achieve the remedial action objective. So any offeror has got to be bringing something to the party that works within those constraints.

Where are the opportunities for differences? It's slight differences in the additive. As I said, different companies have their own version of the pozzolanic additive that may work better or worse for certain applications that would have to be demonstrated. They also might have what are fairly minor differences in the way it's mixed, for instance, off-loaded -- I'm sorry, taken out of the mixing agent. In other words, process modifications but the same basic technology.

MS. WILSON: But at the same time you couldn’t be sure that the results would be the same as what you were saying in these two alternative chemical stabilization methods?

MR. HAGEN: No, that’s right. I think there’s a strong basis of confidence that we would achieve the remedial action objectives. Would there be differences in the treated waste form? There might be slight differences in the leachability rate. In all instances they have to meet the lead leachability standard. And there might be slight differences in the radon attenuation reduction because of a particular chemical or additive that they use. It also might result in differences in the volume; rather than, you know, three times, it might be two and a half times more, or it could be three and a half times more. I don’t see it getting much out of that envelope. But, yeah, there are going to be differences, but the bottom line won’t change, and that is it’s going to be a chemical reduction process that has to meet certain specified performance requirements as designated in the ROD, most notably around this reduction of leachability of the RCRA constituents. Those are going to be absolutes.

MS. WILSON: Okay, thank you.

MR. STEGNER: Let’s take a break, and we will set up for the formal public comments.

MS. CRAWFORD: Can we take like a really short one because some of us need to leave?

MR. STEGNER: Yeah, we’re going to take five minutes, Lisa.

(Brief recess.)

MR. STEGNER: All right, this will begin the formal public comment portion of the evening, the public hearing. I want to restate that we will be doing this in Nevada next week, for the stakeholders at the Nevada Test Site.

What we ask you to do is either raise your hand, step up to the microphone, otherwise ask to be recognized this evening. When you begin speaking, we ask that you state your name clearly, simply because this is being taken down for the record.

If you have any written materials that you want to submit this evening, you can also give those to me at that time. If not, those can be sent in separately. As I say, this is being transcribed, so what you say will be an the record anyhow.

The comments, questions that we have here tonight will be compiled into a responsiveness summary, and that will be provided to everyone who has signed in here tonight. We will also put a copy of that in the Public Environmental Information Center as soon as it is ready, and that will probably be within two to three weeks after the end of the public comment period, which again ends on May 18th. With that, we would ask that whoever wants to speak -- I think, Lisa, you had asked to speak early, so please proceed.

MS. CRAWFORD: I need to leave right away.

MR. STEGNER: I understand.

MS. CRAWFORD: Quickly, you've all heard my comments on many other occasions, but to kind of put them in a nutshell tonight is I just want to say that we live in a society of less is better, as we all know, and reduce, reuse, recycle are terms that are stressed at every turn these days. So with that, three times the waste load is a little bit mind boggling for me, and it’s a little hard for me to comprehend, and the fact that we are sending three times the amount of waste to somebody else’s backyard seems a little bit unfair, and it really seems technologically wrong to me. Three times the amount of waste also equals three times the amount of shipments in trucks and, again, those shipments will be traveling on highways and byways across this country.

The waste form in a cement waste form, and I call it solidification, it’s cement, sorry, but that’s what it is, is not near as protective, in my opinion, as vitrification is. I’ve not seen a tremendous difference in the cost values. They pretty much look the same to me. I think when we add in some of the possible advance wastewater treatment facility activities, that could possibly bring them in line together.

Some of us have seen and heard the horror stories from around the DOE complexes on the cement issues, and they’re not pretty. They can tell me some work, and that’s fine, but I’ve also seen some that don’t work, so that’s a little scary for us.

The last thing I want to add is if chemical stabilization is chosen, which it pretty much seems like that's what it's going to be, that I want to encourage everybody involved here that you look very, very hard for ways to lower the waste volumes and to possibly lower those truck shipments. There's new technologies at every turn. every time you turn around there's a new technology out there and old technologies are made better and better, and we would just encourage you to be very watchful of the new technologies as they come down the pike. And that's it.

MR. STEGNER: Thank you. JoAnne.

MS. WILSON: My name is JoAnne Wilson. I'm from Fairfield, Ohio, and I would like to make the following comments.

Some of this will go back to 1995, because I think there are many people in this room who were at meetings at that time, and I think it's very, very important that you realize some of the advances that have been made since that time. In 1995, when it was announced that there was all this radium in the silos, and many scientists and doctors came to see collectively what might be done to preserve this for medical research. However, at that time this was just a -- it was just talk as to what was possible.

I would like to be able to report today in 2000 that Dr.David Scheinberg, who was here at that time and announced a new method of treatment and possible cure, it will take time to see whether it’s an absolute cure, of using one of the isotopes that would come from radium, namely bismuth 213, married or connected with an antibody which will target a specific type of leukemia or non-Hodgkin’s lymphoma and will carry this tiny Alpha-admitting particle to the cancer cell and will kill it wherever it is in the body. If it has traveled from the site, it will get it. They’re called smart bullets, and they have a seek and destroy ability.

The reason I bring this up is that the Sloan Kettering Memorial Institute, Cancer Institute, has been conducting since 1995 various trials, I believe they’re at least in phase two, they may be going into phase three. The bismuth 213 has proved to be an excellent cancer killer. It has mated with a number of these antibodies, and it is treating people who are desperately ill with this. Dr. Scheinberg, whom I have spoken with, has chosen the sickest of the patients to treat. Both of these diseases are hard to treat, and he has figured if he can treat and possibly cure these people, then people who are lesser sick can also benefit.

This is not the only type of cancer that is being treated. The only reason I bring this up so strongly is Dr. Scheinberg was here. There's been nothing in the paper as to how successful this has been. There are other people who are working with medical isotopes in the same manner using specific isotopes, and they are working on treatment of ovarian cancer, prostate cancer, lung cancer, brain cancer, and some other noncancerous things such as heart and even the possibility of AIDS treatment. This is a new type of thing. Instead of irradiating the body with radioactive material, you send bits and pieces in. The body is subjected to less, much less trauma, there's no hair loss, there's no nausea, it can even be treated on an outpatient basis.

The reason that I bring this up, too,

is because contained in the radium which is in the two silos are two very important isotopes, medical isotopes which are in short supply and of which the radium which we have here is the largest known supply all over the world. Bismuth 213 and actinium 225 are both very, very valuable, and I would like to speak on the alternative of trying to preserve this radium. Both of these methods, the vitrification and the chemical stabilization, will put this 10 pounds of radium out of use of the medical community. It will be gone, it cannot be used. Some people say that you can take the glass capsules, crush them down and treat them. The cost, from what I've been able to gather, would be extremely prohibitive. The same way, I think the chemical stabilization is even worse in possible retrieval later on, if at all.

I think that the radium here is extremely valuable. I think your presentations tonight have been very, very good and they certainly have been honest ones in that there is no real easy way to treat this material. We wish that there was. Each one of them has a, its own problems, complications, uncertainties I think you were careful to point out, and I think that honesty is good to see.

I have, and I've come to this meeting with an alternative, which I have discussed with other people in the DOE, with scientists out in Hanford, as a method of removing this material completely from the neighborhood in a much less complicated manner, and I would like the DOE and the EPA and all the other involved agencies to consider this. The biggest problem we have is getting it out and my proposal is this: That the contents of the silos be removed as they are with no treatment here, and that in the process or before this, of course, that some agency, some site, some commercial company be either given or sold this, however to take it out of our hands.

There are many companies in this country and in Canada that are very competent in processing radioactive material. They do it all the time. They separate different things out. It's no big deal to them. If this material could be disposed of to such an entity, and I'm not saying that they would be easy to find, I am suggesting that we would, for example, try an entity in Canada. A number of years ago there was a company called, I believe it was Rioalto –- Rioalgum, that’s correct, who was interested in the material, and as I understand it, they did the problem with them is that they didn’t have any method of final disposal of the waste product after they had taken the radium out. I think someone said that they were just going to dump it somewhere, if I remember. If we were able to give, sell, dispose of the material in Canada, for example, and I use Canada because there’s a lot of uranium mining being done there, and they know how to care for and process radioactive material, it’s no big deal, it’s their living. They could decide on the method of separating put the radium from the barium sulfate which is contained in this. If you have to process it, barium sulfate is taken out and then that has to be processed in order to get the radium salts. But once this is done, the material, the residue, the radium can go to a reactor and can be changed into many, many valuable isotopes, medical isotopes, and I stress that. This whole area is just beginning, and I think we would be proud, extremely proud if we could be the source of saving lives of people with various types of cancer.

It may seem like an odd proposal, and I realize that, but our biggest problem here is to get rid of the material in the silos. And I know that there are places that could take it. It's just a question of working with -- finding them and working with them. Perhaps it sounds too simple. What we've heard has been very complicated, very interesting, but very complicated.

So I offer this proposal. I am at this time talking with different people, different mining companies to find their interest, see if there is any. However, I do not believe and, Gary, correct me if you have any different information, I do not believe at this time that the DOE has put out any type of requests for comments or proposals to, for this type of treatment or disposal of the material.

I would also like to end this by saying that the Department of Energy as well as its -- what is it called here -- its Isotope Production and Distribution Division has funded a great deal of money into Dr. Scheinberg's clinical trials and in his work, and so the DOE must have some confidence in what he's doing that is being a great contribution to cancer treatments. I would offer the alternative, and I would also think that we should keep in mind what a valuable amount of radium that we had. If we send it to Nevada, it's gone forever, and people with lymphomas, leukemias, non-Hodgkin's disease, for example, and if you remember, this is what King Hussein, Jacqueline Kennedy, and Tom Landry of the Dallas Cowboys all died of, and I think that we should use this radium, find a way to use it and keep it and not dump it. Thank you very much.

MR. STEGNER: Thank you, JoAnne.

MS. SCHROER: My name is Carol Schroer, and if what I'm going to read makes no sense to everybody, it's because I haven't been able to hear very well tonight.

We knew the silos would be a big part of the Fernald cleanup, and we knew they would be a real challenge. And when vitrification was suggested, it seemed to be our answer to the low volume storage plus the transportation. But when the VIT pilot plant ran into major problems, like square fittings into round holes, I knew we were in trouble. I still know in my heart that to vitrify is really the best way to go, but we must move on and we must get to the silos and get them taken care of, and my one prayer is that it be done with every precaution and that it be done correctly. We live here, and we want to be sure that we're still here when the silos aren't.

MR. STEGNER: Thank you, Carol.

MS. YOCUM: I'm Edwa Yocum, and as a resident living one and a half miles south of the Fernald site, which is also a disposal and storage site, and it contaminated the environment, I really prefer the vitrification process for its reduction of the toxicity, the mobility, and the low volume of treated waste and less volume for shipping. But when I think about the workers and their safety, I have to select chemical stabilization. Because, yes, it's easier possibly to implement than what vitrification is right at this time, but who knows what can happen to the vitrification technology in another four years. But still we must move on and get this job done. So I will accept chemical stabilization, but also I would like to add too, as treated silos 1 and 2 waste must not remain on the Fernald site or be placed in the on-site disposal facility if NTS's doors close, Thank you.

MR. STEGNER: Anyone else?

MR. DAVIS: Douglas Davis. I want to take an opportunity to be very brief, you've been very gracious to our company in the past in allowing us in discussion, and I'm very impressed with the level of consideration that's come into this whole problem. I think this is amazing. I might like it if it were shifted a bit, but that's not the point.

I did want to say just a couple of things about glass, though, I think it gets into your soul a little bit when you work on glass developments for months. In terms of safety I have to say that I feel better about thinking about a durable glass at a site where, even if our infrastructure is totally gone and even if it's no longer an arid area, the radon, the radioactivity, the lead, is still contained and can't wander off.

The other thing that several times we've talked about, and I think perhaps we haven't given it as much emphasis as we might, is to the large commercial glass industry that operates all around the world, not with our radioactive hazardous waste glasses, but many of these issues. I think it’s wonderful that we’ve gone and considered the opinions of the workers, that’s very important. Surprisingly that’s not done very much. But a slightly increased inherent risk in a process does not always result in more injury because you can build in, and I think the glass industry is a good example, they have built in the structure to be a very safe industry. Even in parts of the world where they don’t even have the infrastructure that we have.

In talking about greater implementability, you know, our company, one of the things we do is build large float glass plants, and one of the demands that’s often put on us is, okay, here’s an order, we would like to have glass running out in sheet form in two years. That’s very common. So, you know, through construction planning and engineering planning you can put together complex projects very quickly, and it’s still with good quality control.

And I guess under the question of

operability, again I would just mention some of these plants that are run commercially, we commonly as part of our contracts to a customer, now these are not radioactive waste raw materials, but part of our warranty is that day after day these operate with less than two or three defects per ton of glass. So, the commercial industry sits there and runs, it’s very operable. Just want to make sure we just think about that, and I appreciate your consideration.

MR. STEGNER: Thank you, sir.

MR. GELS: My name is Jerry Gels. I’m a health physicist. I’ve been coming to a lot of these meetings and was about to go on the record as saying that I thought that cementation was the better alternative of the two because if those are our choices, I felt that, as Ms. Wilson pointed out, that the retrievability would be better than that, although I think she said that it wouldn’t, so I don’t know how to feel about that. But I do feel that the radium 226 that we have in those silos is a resource. We’ve been looking at it as a waste, and it is very true in a lot of short-term viewpoints, it can be considered a waste. If you look at the long term, as she's pointed out it could be considered a resource, and this is a resource that of all the atoms of radium 226 that there are in this country, most of them are in two silos out by Paddy's Run Creek, and they are, depending on the medical results, which I've been trying to find out about for some years now, how that is doing, but depending on those results, they can be a resource of tremendous value to the world, and I think that should be considered in the long run as what we do on that basis, whether we do something that will put those atoms in a form that cannot be easily retrieved or whether we separate them out. And they can be chemically separated, it is possible to do. Marie Curie did it a hundred years ago. It's possible to do it. I don't know if we've looked at doing that, but I think it's something that we ought to look at. Thank you.

MR. STEGNER: Anyone else? Going once, twice. Thank you all for coming.

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MEETING CONCLUDED AT 8:20 P.M.

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CERTIFIED COPY
ATTACHMENT B.II

UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY

PUBLIC MEETING
PROPOSED PLAN FOR
REMEDIAL ACTIONS
AT SILOS l & 2

WEDNESDAY, MAY 3, 2000
NORTH LAS VEGAS, NEVADA
4:35 PM

REPORTER'S TRANSCRIPT OF PROCEEDINGS

Reported by: MARK I. BRICKMAN, CSR, RPR, CCR
Nevada License No. 605

A P P E A R A N C E S

FOR THE DEPARTMENT OF ENERGY: Moderator - GARY STEGNER
TERRY HAGEN

Formal Comments: Page 43

BE IT REMEMBERED that, pursuant to notice of the Public Meeting, and on Wednesday, May 3, 2000, at the hour of 4:35 PM, at 232 Energy Way, North Las Vegas, Nevada, before me, MARK I. BRICKMAN, CCR No. 605, State of Nevada, there commenced a public meeting.

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MR. STEGNER: Good afternoon, everyone. My name is Gary Stegner. I work in Public Affairs for the Department of Energy at Fernald. I want to thank you all for coming here this afternoon.

With me are Nina Aksunduz. She is the Silos Project Manager for the Department of Energy - Fernald. Gene Jablonowski. He is Region 5 EPA, Fernald Program Manager for US-EPA there.

Terry Hagen, for Fernald and also Dennis Nixon.

Since Nevada stakeholders could potentially be impacted by the course of action we choose to remediate Fernald silos, we figured we would provide the same public involvement opportunities for you as we did for our own stakeholders last week.

What we did then we hope to do tonight is two distinct segments of a -- a meeting.

First is an informal review of the program that we're proposing, and that will be followed by informal question an answer session, which combined should take about thirty minutes.

We would ask you to hold your questions until the presentations are over. That will be -- consist of a video, which you guys have requested we produce, which we have done, and also a short presentation by Terry.

Then that will be, as I say, followed by the informal question and answer session.

If you want clarification on any aspect of the project, that's the time to raise your questions at that time.

That will be followed by a formal public hearing where we will be exclusively in a listening mode. We will not be responding to anything at that time. We will simply be taking your comments on the Revised Proposed Plan Silo Project.

Your comments will be transcribed and be part of the official public record on the silos project.

We will respond to any and all comments received by Nevada stakeholders through formal responsiveness summary document which will be provided to all commenters and will also be placed in your public reading room and public information center. Those will be placed here and also at Fernald.

If you would rather submit your comments in writing to me, you can certainly do that. You don't have to speak on the record tonight. Those comments should be postmarked by May 18th if you want them to be included in the formal record.

As I said, the project overview will be presented in a video form which was prepared by request of the Nevada stakeholders, and following the video, Terry will offer a short briefing, after which you can ask your questions.

At the conclusion of the question and answer period, then we will go into the formal public comment period.

So with that, if you could queue the video and we'll get started.

(Videotape is being shown at this time).

MR. HAGEN: What I'd like to do is move this clip down. So to briefly summarize and supplement the data in the video against the criteria that EPA mandates for consideration when you make a decision in the CERCLA, and they're the same ones that were -- that were presented in the video.

I apologize for the font size there. I know it's a little hard to read, but you’ve got it in your handouts. Maybe you can follow along.

We'll talk about all nine of these, and real quickly, you see the bottom two don't have an assessment; rather we felt that there was a favoring for vitrification and chemical stabilization, either/or.

The state acceptance and community acceptance, that's evaluated based on the results of these public involvement forums, so actually I'll be talking about seven of the nine.

The first criteria is called overall protection of human health and the environment, and this is what's called a threshold criteria under CERCLA, which means that the EPA requires that before you can select a remedy, you must demonstrate that it adequately -- again I apologize. We were trying to make this readable. That it adequately addresses this particular criterion.

What we concluded is that both stabilization and vitrification do pass this threshold. The protection is provided by a combination of removal at Fernald, treatment to address the RCRA metals in the waste and also treatment to meet Nevada Test Site waste acceptance criteria and performance assessment requirements and long-term stable disposal at the test site.

The second threshold criteria is called compliance with applicable or relevant and appropriate requirements.

Our conclusion again was that both technology families met this threshold criteria.

The primary ARARs that we're concerned about -- we're concerned with all of them and we have to meet all of those, but the ones that really drove the analysis, number one, are the NESHAP sub-part 2 radon flux limitations, and what we found is is that both technologies when combined with their packaging met this ARAR, and then second, of course, are all the Department of Transportation requirements for transportation.

Again the analysis -- and we'll talk a little bit more about those Department of Transportation requirements, but our analysis is that both alternative families, technology families meet this threshold criteria.

What that means under CERCLA is that once you screen your potential alternatives against the threshold criteria, some get screened out.

Those that -- that pass through that screening are then eligible for a comparative analysis against five balancing criteria. Those are the next five that we're going to go through.

The first one is long-term effectiveness and permanence. Our evaluation along with US-EPA was that both technology alternatives performed at approximately the same and performed adequately.

The basis for saying that both provided adequate long-term effectiveness and permanence is really the same argument that went with the first threshold criteria; that is, removing at Fernald, treatment to meet regulatory requirements for the leachable –- RCRA leachable materials in there, also to meet the waste acceptance criteria at the test site and performance assessment requirements and then stable disposal, long-term disposal at the test site.

Again, equal -- equal and adequate performance by both technology families.

The next of the balancing criteria is called reduction of toxicity, mobility or volume through treatment.

In this criteria, it was our assessment that there was a distinct advantage to the vitrification technology, and that primarily relates to the treated waste volume, and at the end of the presentation, I'm going to present a couple of slides that are intended to directly address some questions we got from the Transportation Subcommittee of the CAB, and there's also another one coming up here in just a second that show those volumes, but there's -- there's a lot more volume associated with chemical stabilization than vitrification, and that's the primary basis. We'll cover all of these sub-components.

Basically chemical stabilization produces about three times the amount of waste than vitrification, and hence the basis for the advantage to vitrification.

About 12 to 1,300 -- depending on which particular iteration of the chemical stabilization technology, between 12 and 1,300 cubic yards -- cubic feet -- I'm sorry. It's -- it's 1,300,000 cubic feet -- sorry -- of material that would require disposal at the test site versus 3 to 400,000 for vitrification.

For secondary waste volumes, you'll see those were approximately equal. The secondary waste associated with vitrification are a little bit more difficult to deal with than those associated with chemical solidification. Some of them are mixed waste.

Also because of the nature of the high

temperature operation, it tends to drive off more gas type materials and more gaseous emissions that have to be dealt with.

So we do believe there’s a slight advantage to chemical stabilization relative to secondary waste, but not enough to undo the significant increased volume there for chemical stabilization.

Short-term effectiveness is the next balancing criteria. Short-term effectiveness basically consists of a couple of subcomponents.

Worker risk, risk to the workers associated with actually removing the material and treating it as well as the workers involved in transportation, and then again those workers also at the test site who would be involved in disposing of these materials, and then the -- the last subcomponent is how long it takes to complete the remedy, time to protectiveness.

Our evaluation here was that there was an advantage for chemical stabilization, primarily driven by the worker risk issue, and we'll talk about each of these sub-components here.

Relative to radiological dose, which is what a lot of people have -- have historically assumed would drive the worker risk, that's about the same for the different alternatives.

The difference comes in the fact that -- and we've got an overhead here coming up to demonstrate those hours, but there are a lot higher number of working hours required to complete the project under vitrification than for chemical stabilization, and statistically what that results in is a higher probability of some kind of accident for the workers in implementing that technology.

Also, vitrification is a high temperature, high power, high voltage operation which has some inherent risk to workers associated with those issues versus chemical stabilization, which is an ambient temperature batch type, room temperature batch type operation.

And then finally both of these technology families would be implemented remotely, but for maintenance of the system, that would be done by contact; in other words, workers going in and actually maintaining, fixing, et cetera, and again for some of the reasons associated with the high power, high temperature, we think there's a greater risk to workers during maintenance operations.

Relative to transportation risk, there is an advantage to vitrification, and that links directly back to what I talked about a while ago; that is, there's three times the volume of material to be handled, to be dis -- to be transported and be disposed for chemical stabilization.

Statistically that equates to about three times the transportation risk.

Now, a couple of points to be made: One is is while there is a clear advantage to vitrification, CERCLA/ US-EPA requires us to do a number of evaluations of what are the risks associated with transporting this material under an accident free scenario, but also what are the risks associated with this material in the event of an accident to the general public, response workers, et cetera.

What we found was that those calculations were well within what the CERCLA process, at least, considers to be acceptable risk to the public, transportation workers, both under routine circumstances and in an accident scenario.

And then the second element of that evaluation was that there actually were higher -- acceptable, but higher risk to emergency response workers through the vitrification technology.

The reason being is vitrification basically concentrates the waste, whereas the -- the clearest way to state it for chemical stabilization is by adding the -- the various things that bind the contaminants together, you're diluting the waste, you're diluting that radioactive source.

So there's actually a higher source term because of the concentration of the waste with vitrification than chemical stabilization. So that's the basis of the -- of the last conclusion.

The other issue -- I don't have an overhead for it -- was time to protectiveness.

Based on data that we received from the vendors that were involved in the proof of principle testing that was referenced in the video, that data said that we could implement chemical stabilization approximately a year quicker than vitrification.

So that coupled with the increased worker risk was the basis of saying there was a -- an advantage to chemical stabilization in this balancing criteria.

The next balancing criteria is implementability, which is pretty much what it sounds like, your ability to successfully with a reasonable degree of certainty implement this technology.

It was our conclusion that there was an advantage to chemical stabilization. Again we'll talk about some of these things.

The first one is scale-up.   We rated that neutral. The reason we rated that neutral -- in other words, no advantage in one direction or the other -- is is that there are examples, albeit very, very limited for vitrification that we're going to discuss in a second.

There are examples for both technology families, however, of -- of facilities operating at the scale that we would require at Fernald to complete this project in a timely basis. So we rated that neutral.

From this point forward, we feel -- for the reasons I'll go into here in a second -- that there is an advantage to chemical stabilization.

The first one is commercial demonstration which EPA requires us to look at. If you go out, which we did, and look at hazardous and radiological contaminated sites throughout not only the United States, but also the world, we found many, over a hundred instances to where chemical stabilization had been selected and selec –- successfully implemented to manage waste under CERCLA sites through CERCLA records of decision, through NRC response actions, in some instances through corrective actions under RCRA.

There was a very, very limited database of -- of applications of vitrification, and what that translates to is not that vitrification won't work. It translates to it's just not proven to the same degree of chemical stabilization, which is a factor that again EPA requires us to look at.

The second aspect is operability. The video basically talked about the differences in the technology, and what this boils down to is the number and the complexity of unit operations.

To successfully implement vitrification requires a number of steps, technical steps -- again, as briefly discussed in the video -- that are more numerous and more technically challenging than chemical stabilization, which is basically an ambient, fairly low-tech operation.

That's not to say there aren't challenges since we have to do this remotely, because there are. It's not a slam dunk we're going to go in and do that successfully.

The point is that it is a simpler operation, and that's fundamentally the basis of our conclusion that there was an advantage for chemical stabilization.

The other thing that you saw up there was two other points, contractibility, which links directly to what we just talked about.

We show an advantage for chemical stabilization because there are more unit operations, more complex equipment to put in, and in particular the melter itself with its refractory lining, it's something that has to be done to very tight tolerances and has to be done at the site. It's just harder to build, hence an advantage for chemical stabilization.

The other one is something we called ease of acceleration. I think the -- the best way to show that is -- is to reference the number of hours we talked about a little earlier in the presentation that it requires the number of -- of unit operation hours that each technology family would require to finish this project in three years, which is arbitrary, but for illustration purposes, it shows a significant difference.

You're talking about anywhere from 7 to 10,000 operation hours for chemical stabilization depending on which specific tweak of the technology you use versus 16,000.

That means it's just a lot harder to get done quicker with vitrification.

It also introduces more possibility for equipment failure just through routine wear and tear and things of that nature. Again the basis of the conclusion under ease of acceleration that proves an advantage for chemical stabilization.

The last of the balancing criteria is cost; not a big difference. CERCLA requires that this stage in the process, the feasibility study phase of the process before you go into de -- detailed design that you develop cost estimate -- cost estimates for these technologies to an accuracy of plus 50, minus 30.

We think we're a lot tighter than that, and what it shows is is there is a slight advantage for chemical stabilization, maybe a ten percent difference between the two, which within that range of accuracy that I talked about isn't particularly meaningful.

So, again, very slight advantage for chemical stabilization, but not a real driver in our mind for the decision. Important, but not a differentiator between the two.

The other two criteria -- again, state acceptance and community acceptance -- will be based on these forms with you all, the public hearing that we had in Ohio as well as comments from the Ohio Environmental Protection Agency.

That really wraps up the comparative summary among -- against the two alternatives.

What I want to do is give a couple of additional pieces of information, and this is based on questions that came out from the transportation subcommittee of the CAB last week. Some of our people were here talking to them.

Wanted to know a little bit more information about transportation, which presumably is the primary concern of -- of this group of people. I don't want to presume too much, but we'll just get to this point.

Silos 1 and 2 material are LSA or low specific activity II solid material, and what that means is we have to use a particular type of container, which I'll get to on the next slide, and there's also limitations on the rad field that can emanate from the material shipments, and you see what they are here.

200 millirem per hour on contact with the container at conveyance, 10 millirem at 2 meters from conveyance, 2 millirem an hour to the driver, and just to put it in perspective, what is the untreated field coming off the silos material? Up to 900 millirem per hour.

With packaging, both technology families perform about the same, and that is approximately 50 millirem per hour on contact with the container or about four times less than what the regulatory limit allows and conversely about four times under these other limits, as well.

Relative to the package itself that we will be obligated to use, the container has to be the Department of Transportation 7A type A container, which means that it has to be certified, and it has to be certified using these tests.

The water spray test which basically is water can’t get in or can’t get out, to put it at its simplest. The drop test, three foot drop test in a manner that causes the maximum damage.

That's to simulate what happens to it in an accident scenario and it's got to maintain its integrity and its ability to hold the material in there.

Penetration test, also looking to judge the stability of the container in a particular type of accident scenario. Compression test the same.

We have a certified container that -- when I say "we,” I’m talking about Fluor Fernald at the site, and I’ll put up an overhead about it here in a minute.

Whenever we do this project, it is the current intent to give the vendor the ability to propose a specific kind of container.

So it could be different than the one we've got, but if it is different than the one we've got, they're going to have to certify it and they're going to have to certify it against these particular tests.

Another question is relative to the total volume of material being generated from the Fernald cleanup, how much is coming here, how much is staying there, and I presented this to -- to some of you I think in December.

Three-quarters of the material being generated from the Fernald cleanup are staying at Fernald in a -- in an on-site disposal facility. Roughly two and a half million cubic yards of material.

About sixteen percent of the materials according to current plan will go to Envirocare.

For those of you who have been to Fernald before, that's primarily our waste pits project, about 700,000 cubic yards -- actually a little less than that, but on that order.

Eight percent of the total material to be generated by the Fernald cleanup will come to the Nevada Test Site.

Now of that eight percent -- you see that this goes back to 1985. Of the eight percent of our total volume, about seventy-five percent of that material is already here, okay. It's already here and in the ground.

So the remaining waste stream to come to the Nevada Test Site is primarily what we've been talking about tonight. Most of our legacy waste is already out of Fernald and safely at the site.

One last point. It is the current proposed plan that the treated materials from Silos 1 and 2 come to the Nevada Test Site.

That is because right now there is no commercial disposal facility that has the disposal capability and/or is permitted to take this particular type of material.

Envirocare has voiced a number of times -- for those of you who are familiar with that commercial disposal facility up in Utah, that they are going to be pursuing some, I guess, liberalization -- that's my own word -- of their permit that might allow these materials to go to Envirocare.

If that's the case, it -- it would be our intent to explore that option, or if any other commercial disposal facility became available to us, we would explore that option, too, and if it was safe and cost-effective, we'd go there, and what's the probability of it being cost-effective compared to NTS?

Right now it's cheaper for us to send the material to Envirocare because we've got the ability to send it door to door by unit rail train.

Of course, that capability is not test for the test site so we've got to send it in individual trucks.

My point is if -- if we ever have the ability to go somewhere like the Envirocare, in all likelihood, we will.

I apologize. I probably got this a little bit out of order, and I'm going to -- I think I get most of it.

I mentioned earlier that we do have a container right now that is certified, and we got it from the SEG Corporation.

This is -- this is that container, and our baseline, our current plan assumes use of this concrete container for transportation of the stabilized material to the test site.

Again, we will give other vendors the opportunity to optimize design of this box, this container, but if they don't use this one, they're going to have to certify it according to the standards that I mentioned on the previous slide.

That sums up my presentation. I'm going to waltz back to the back table and we're open to take any questions that you might have prior to the formal public hearing.

MR. STEGNER: If you have any questions right now, we'll take those and answer them prior to the formal comment period. Once we start taking your formal comments, we'll sit and listen.

AUDIENCE PARTICIPANT: With regard to the last statement you just made, the gentleman here, you have the certified container.

To whom -- what certified it?

MR. NIXON: It's the Department of Transportation.

AUDIENCE PARTICIPANT: It's not certified by the NEPA or any other agency?

MR. NIXON: It's not.

MR. STEGNER: Terry put up a slide on the Department of Transportation it's a 7A type container and what’s required to certify that through the Department of Transportation. That's the material.

AUDIENCE PARTICIPANT: Can you tell me who makes it again?

MR. NIXON: It's a commercial container that was developed by SEG for commercial use.

MR. HAGEN: The answer to the second part is yes.

AUDIENCE PARTICIPANT: Do you have to have a special vehicle to haul these? Are you going to have any kind of markings on the trailer on the outside?

MR. NIXON: It would be placard

MR. HAGEN: LSA material. Yes, sir.

MR. CLAIRE: Don, would you use your mic so we can all hear and we won't ask the same question a second time?

AUDIENCE PARTICIPANT: Can you hear me?

I've got several other questions, two or three.

Okay. So we have the certified container going down the highway assume like flatbed trailer, two of these containers per tractor trailer.

It is parked by some McDonald’s and the driver wants to get a hamburger or something. If you took a rad meter and went out and surveyed that -- the outside casing of that, what type of radiation amount would we get on the --

MR. NIXON: In contact with the container?

AUDIENCE PARTICIPANT: What are we talking about? How many millirems?

MR. NIXON: 70 millirem per hour is what we designed the process that's proposed for -- the chemical stabilization process would be -- result in about 70 millirem per hour on contact with the package.

AUDIENCE PARTICIPANT: That's the two containers together?

MR. NIXON: That's direct contact on the container itself. As you go away from it -- from the container, it would be significantly less.

AUDIENCE PARTICIPANT: All right.

MR. NIXON: And Terry put up a slide which had the require -- what the Department of Transportation requirements are.

It's based on 200 millirem per hour on contact with the container.

Our design is -- is much less than that at 70 millirem per hour. So it would be very conservative.

AUDIENCE PARTICIPANT: My next question, other than the nuclear test site, what other avenues of disposal has Fernald looked into?

MR. HAGEN: We've looked at number one, commercial disposal, and there is no commercial disposal available at this time that is within the constraints of the license that have the ability to take this material, number one.

Number two, we looked at leaving it at Fernald. We do have an on-site disposal facility that our stakeholders and regulators agreed to.

There were waste acceptance criteria established for that material based on the fact that their sole source of drinking water for Cincinnati is the aquifer underneath of the on-site disposal facility and created a number of contaminant specific waste acceptance criteria, and this material is significantly above the waste acceptance criteria for the on-site disposal facility.

So that ruled out on-site disposal at Fernald, and again, no off-site commercial disposal facility that has the -- the licensing in place right now to take this material.

Our Silo 3 material, which was referenced at the beginning of the video, is going to -- in all likelihood will go to Envirocare, because that is material that is within the constraints of that license.

AUDIENCE PARTICIPANT: In New Mexico, that hasn't been --

MR. HAGEN: Are you talking about WIPP?

AUDIENCE PARTICIPANT: Yes.

MR. HAGEN: This is low-level material. WIPP as I understand it -- I'm not terribly familiar with the internal workings of WIPP, but that's for transuranic storage and other materials. A low-level waste is not technically envisioned for disposal at wipp and this is a low-level waste.

AUDIENCE PARTICIPANT: Okay. That concludes my questions. Thank you.

MR. HAGEN: Thank you.

AUDIENCE PARTICIPANT: I have a couple of comments and then a couple questions.

Firstly, from the standpoint of Nevada, you know, the cost difference between your two alternatives is minimal, especially within the kind of, you know, estimates that we're talking about today, and if you use vitrification as opposed to chemical stabilization, we're going to have less volume of junk coming to our state, number one.

We're going to have less of a problem transporting because there's less volume, right? You said that yourself.

I guess that makes a problem for me. Why should we take your waste when you have an alternative which is not going to cost that much more for you, but might be costly to us?

My other comment, I used to live in Tennessee and worked at Oak Ridge. We were working on vitrification in the 1950s.

Do you mean to tell me -- I heard you say, "We don't know enough about it."

How could you not know enough about it? How can you not know anything about it at this point in time? That's forty years ago.

Those are my comments.

Question: What happens -- I assume you're using filter presence, right?

MR. NIXON: Yes.

AUDIENCE PARTICIPANT: What happens to the filtrate? Number one question.

MR. NIXON: Treated on-site.

AUDIENCE PARTICIPANT: How? That's going to be really concentrated. You're going to have to do something with that. That's going to be another probably worst waste than you have in the solids, possibly, anyway.

MR. NIXON: Well, it's going to go through wastewater treatment at the site and then we have an advanced wastewater treatment before it's discharged to the -- to the river for radium.

Primarily we will be removing the radium at the processing facility.

Now how -- how that will be designed will be again dependent on the vendor to design on how they propose to deal with that aspect of it. That has not been ––

AUDIENCE PARTICIPANT: That can be -- that could be a real problem in terms of wastewater treatment. You're going to have some real problems getting rid of those heavy metals in a way that doesn't affect the environment, so to speak. Some river. Cincinnati, Ohio.

The other thing is I guess it bothered me that you're going to use either an oxide or some metal, iron -- I don’t know what your precipitous is going to be. You're either using iron, aloe, lime, whatever. Those are all going to result in a higher pH; that is, your solid matrix.

If you bury that in the ground according to all the nuts, the environmentalists, you're going to have more and more acid rain, right? As acid rain filters down through the ground, what happens to all these metals?

I know what's going to happen to them. If, in fact, that happens, and we do have some rain here -- not like Cincinnati, but there's a little bit of rain here.

Is -- is that a concern?

MR. NIXON: It certainly is a concern. The process that is proposed here using a trisodium phosphate as the stabilizing agent for the lead compound to make the lead compound immobile.

AUDIENCE PARTICIPANT: Yeah, but it's still tied up with a high pH environment.

MR. NIXON: Exactly.

And then after the lead is stabilized with the trisodium phosphate, then cement and in one paste fly ash would be stabilized or solidified with the cement in the fly ash for final disposal.

Now the waste acceptance criteria at the Nevada Test Site is based on the TCLP analysis where we actually take the stabilized waste and we grind it up and we do this analysis, and the analysis is meant to essentially mock what happens in the environment under infiltration of acid rain.

It's counteracted with an acidic solution over time, and then that solution is analyzed for its constituents, and that's how we meet -- demonstrate that we meet your waste acceptance criteria through that testing.

So it's essentially the test. The TCLP analysis is there to mock up exactly what you had defined, the infiltration into a landfill of acid rain.

So if we meet that TCLP analysis or meet the -- the leachate is below the TC limits, the regulatory limits, then theoretically that would no longer be an issue in nature.

AUDIENCE PARTICIPANT: The bottom line of my question or comment is that from the standpoint of Nevada, we would recommend -- I would recommend -- and I'm a registered engineer. I would recommend using -- using vitrification.

I know it will cost you ten million dollars more dollars in Fernald, but using that much waste coming into our state, why not? Well?

MR. HAGEN: Do you want a response or is that a --

AUDIENCE PARTICIPANT: I want to ask you a question that's relative to that.

AUDIENCE PARTICIPANT: Let him respond first.

AUDIENCE PARTICIPANT: Well --

AUDIENCE PARTICIPANT: Let him respond to the question. I want to hear his response.

MR. HAGEN: Okay. One thing I probably should have spent more time with, you know, relative to your comment about you've been working with vitrification since the ‘50s.

The simple fact is for waste streams like this, nobody has gone out and done it very successfully.

There are a couple of instances to where it's been done, Savannah River. I got a feeling you know as much about it than I or more.

Nowhere with the technology that we're talking about in a radioactive remote environment has it been done, not once at the scale we would require for Fernald, and where it has been done at lower scale, significantly lower scale, the fact is is that it was very difficult to get where they were.

I think there's one or two instances in the world where there have been what you would call a successful application of vitrification for this type of waste stream. It was at a lot lower scale than we need, and they went through hell to get to where they eventually got to.

So from our perspective -- I understand your comment, but to answer from our perspective, yeah, there's a 10, 20 million dollar difference in the cost estimate, but the data that we have got from industry tells us that we're going to have a very, very difficult time implementing vitrification if we can do it successfully at all.

We've already had one less than optimal experience with vitrification at Fernald. We look at what's happened at Savannah River. We look at what's happening at Paducah and more recently with DNFL at Hanford.

It's just not a technology that we feel certain that we can go implement in a cost-effective, timely manner.

I understand, and please welcome the formal comment period what you said, but that's -- that's from our perspective why we’re going with chemical stabilization.

All those other advantages are only hypothetical if you can't do it, and the simple fact is is that we're a lot more confident in our ability to get it done with chemical stabilization.

AUDIENCE PARTICIPANT: Thank you.

AUDIENCE PARTICIPANT: Yeah. The reason I wanted to make a comment and ask a question was to compliment Peter's concerns because this is the first time at least I have heard a positive evaluation of vitrification.

All up to now has been exactly parallel to what you've been saying, which I suppose leads to the question of why do you even present the vitrification in a positive sense when you do not have the technology or the capability?

Because if you don't have the capability, you don't have the knowledge, you don't have an alternative.

MR. HAGEN: Yeah. My answer to that is is that we evaluated this -- we, the Department of Energy and the Fernald site back in the early '90s where it was -- notwithstanding the comment that the technology has been around for a long time.

The technology is applied to environmental cleanup was kind of the rage in the early '90s, and so we went through the initial evaluation frankly with -- with a lot of literature-type data, lab scale-type data and we made an over-optimistic assessment of that technology relative to our ability to go do it, at least at the Fernald site.

So with that done, whenever we got into the situation of needing to re-evaluate the technologies, our stakeholders in Ohio felt very strongly that that needed to stay on the table for those comparative evaluation.

AUDIENCE PARTICIPANT: Well. I'm -- I'm perfectly satisfied with your remedial action choice. My only point was I'm not even sure that vitrification should have been given consideration, and that's your business.

AUDIENCE PARTICIPANT: I was -- I was pleased to see that you had a chart that showed the radon flux at silos 1 and 2, and so I assume from that that you had some measurements of the production of radon gas in those -- the vicinity of those two silos.

And then I further assume that with that kind of information, you made an estimate of the kind of contribution of radon gas in the Nevada environment, your disposal is going to make.

Did anybody do that?

MR. NIXON: Yeah. As part of -- in looking at the -- the way that the waste would be disposed, obviously you can see from the chart that the waste itself does not meet the regulatory requirements, which is basically 20 picocuries per meter -- square meter per sec -- per second.

But once packaged, it would meet the NESHAP requirements; not only for interim storage, but for long-term disposal. Combined with the disposal facility.

When we ultimately do the performance assessment for the final disposal of this waste in its final form, that will be one of the key parameters that's evaluated for the disposal configuration to be sure that the waste itself, even after the package is possibly compromised over time, would still meet the radon flux limits on the top of the disposal -- disposal cell itself.

AUDIENCE PARTICIPANT: I just have one more question. I was wondering about the possibility of instead of putting all of that good shielding in the ground, I thought maybe you could design some kind of a shell that went over each container, and then after it’s offloaded, return those shells back to Fernald.

MR. NIXON: That was evaluated. That certainly was evaluated, and let me tell you the main reason we -- there's two reasons, really.

One is worker risk. Putting the waste after it's treated into an unshielded container is going to require us to handle both at Fernald and at Nevada.

So there's a significant worker risk issue before it gets into the shielded container for shipment.

Secondly, you have the shipment that is not dedicated two-way trans -- transport. It's dedicated to the NTS site itself.

We would have to pay to have the container delivered back to the Fernald site at a significant cost to the project.

Really from our standpoint it's worker risk. we want the waste to go directly into the shielded container and have the waste shielded for the workers both putting it in the container and dealing with that at Fernald and offloading it here and putting it into the disposal cell.

AUDIENCE PARTICIPANT: Thank you.

I've got a couple questions. Is this a NEPA process?

MR. NIXON: Yes, yes.

AUDIENCE PARTICIPANT: The NEPA process requires that energy consumption be a consideration. I don't see that as one of your criteria.

We are importing over fifty-five percent of our energy. The Department of Energy has a responsibility for this area, and it is an issue which should be kept before the forefront of the public.

MR. NIXON: The feasibility study that led up to this proposed plan that we're presenting tonight was a full environmental impact statement when it was originally done. As revised, it's -- we did a supplemental analysis to our original Environmental Impact Statement.

So yes, those things are evaluated in the -- in the detailed document, the feasibility study. They're not presented to you here.

AUDIENCE PARTICIPANT: In regard to energy consumption, we got process of transportation and disposal.

What alternative has the least energy consumed?

MR. NIXON: I'm not sure I can answer that.

AUDIENCE PARTICIPANT: It's an important question.

MR. NIXON: Yes, it is.

AUDIENCE PARTICIPANT: You folks should be able to answer that.

MR. NIXON: I would have to -- I would have to -- I don't have the information here in front of me.

AUDIENCE PARTICIPANT: We spend probably a hundred or 200 million dollars protecting our foreign oil resources with a military force and our energy consumption is increasing.

So this is a very major national issue and also a national security issue. Most people don't think about it.

MR. HAGEN: The exact numbers I can't quote. It was -- obviously it was significantly higher for the transportation element for chemical stabilization just because of the shear, you know, increased number of shipments.

As far as the on-site treatment aspect of it, it was significantly higher vitrification because of the -- the high power requirements for that technology. I can't quote the numbers. I apologize.

AUDIENCE PARTICIPANT: Just for a point of information, in Europe, country of France, the vitrification process is quite sometime.

As a matter of fact in 1998 and 1996, the power plants in Europe were sent the waste vitrification and particularly in Germany, by rail car back to Germany for storage and all kinds.

Are you aware of that?

MR. HAGEN: Yes. In fact, I didn't get to -- the boss got the glory trip, but we actually went to La Havre. in France and also to Britain where they're doing vitrification.

Basically they are doing it, but on a very different waste stream. So we didn't think it was --

MR. NIXON: We evaluated those facilities under commercial demonstration. They're on much smaller scales, but homogenous, high-level -- specifically on high-level waste. Never on low-level waste.

MR. HAGEN: Our boss actually went there and actually looked at these facilities.

MR. NIXON: These same facilities, the low-level waste or a portion of the waste that they have on-site is also being chemically stabilized, as well, or similar process.

AUDIENCE PARTICIPANT: What type of cement is going to be used in the ––

MR. HAGEN: Cement is a generic term. I'm sorry.

AUDIENCE PARTICIPANT: That's okay.

MR. HAGEN: You know, cement stabilization is kind of a generic term that applies. What is more likely in my opinion -- not that a successful vendor couldn't use straight cement -- is they're going to have their own little proprietary version of some pozzolanic based additive.

So it will be some tweak, their own little proprietary tweak, and it will probably have the basics of cement in it, but it will have other things in it, too.

MR. NIXON: These are all type A cement with the stabilizing agents in it:

AUDIENCE PARTICIPANT: They got some good state of the art material.

MR. HAGEN: Yes.

MR. NIXON: And that very well will come into play with a competitive environment that vendors will be asked to engage in.

AUDIENCE PARTICIPANT: What I'd like to -- rather rude. I'd -- I'd like to really -- want to thank you all for having the public hearing out here and also for the meeting you had last week.

I found you responded to our questions and we had a number of them and I thought there was a good demonstration of interaction among sites, which I hope can happen with other sites.

One -- one question I had. You indicated the majority of the waste has actually arrived at the test site.

And how does that compare with the material you've already shipped? How does it compare with the material you're proposing to ship from the silo program as far as risk? Just ballpark or if you're able to do that.

MR. HAGEN: As far as a calculated number, I can't do it, but in terms of a type of material, most of it does not -- most of the material coming does not have the same degree of radium content within the radon generation, which is really a primary issue during waste transportation.

Most of the material would have fallen into the LSA-1 category versus the LSA-2.

AUDIENCE PARTICIPANT: The prior material?

MR. HAGEN: Yeah.

So, you know, all low-level waste, all -- you know, what I would say within the same order of magnitude of risk, although what’s unique about this particular waste -- waste form relative to transportation issues, we'll probably do that radium content.

MR. NIXON: We've shipped similar compact dose rates on the container that didn't require this level of shielding to get to those levels, to that 50 to 70 millirem per hour.

AUDIENCE PARTICIPANT: Thanks.

AUDIENCE PARTICIPANT: I've got a couple questions. Just kind of help me understand this.

On this sheet that you have here, you've got volumes.

MR. HAGEN: Yes.

AUDIENCE PARTICIPANT: Is this just the waste or does that include the containers alone?

MR. HAGEN: It's the container -- it's the entire waste volume that would go into the ground including the container.

AUDIENCE PARTICIPANT: Just roughly figure the loads out, how many loads are in --

MR. HAGEN: That's about 6,000 containers and 3,000 shipments.

AUDIENCE PARTICIPANT: On each line or total? I mean --

MR. NIXON: We're talking about the chemical stabilization one.

AUDIENCE PARTICIPANT: Each of them. That's what I --

MR. NIXON: If you look at the tallest one, which would be M-1, which was our cement base chemical stabilization, that is equivalent to 3,000 shipments.

AUDIENCE PARTICIPANT: Okay.

MR. NIXON: Two containers per shipment.

AUDIENCE PARTICIPANT: I just kind of wanted to have an idea.

On this box, is this a picture of the actual box that -- basically or is it something different?

MR. NIXON: That's a picture of a box that was used in the evaluation. As Terry said earlier, the vendor who ultimately performs this design construct and operate the plant may decide to select a different package.

AUDIENCE PARTICIPANT: Okay.

MR. NIXON: That would be optimized to his particular process.

AUDIENCE PARTICIPANT: I was just trying to understand how would you fasten the lid on.

MR. NIXON: There again, it would have to be designed, certified in the manner that we talked about.

That particular container is in connection with a gas, a neoprene gasket, but that is not necessarily the package that would be used.

AUDIENCE PARTICIPANT: Okay. These silos -- you're emptying silos; is that correct?

MR. NIXON: Yes.

AUDIENCE PARTICIPANT: Are you going to reuse the silos or they look like they were kind of getting pretty well --

MR. NIXON: They'll be demolished.

AUDIENCE PARTICIPANT: Are they being hauled out here, too, or someone else or do you have your own -- where does that material go when you demolish those?

MR. HAGEN: Silos 4 will go to our on-site disposal facility. Silo 3 will go to our on-site disposal facility. Silo 1 and 2 rubble will come to the test site.

AUDIENCE PARTICIPANT: Is this in this volume here or not?

MR. NIXON: It's in that volume. It's in our cost estimate, yes, here, but it's also in our low-level waste shipment estimates in our waste management program.

AUDIENCE PARTICIPANT: Okay.

MR. NIXON: It's already covered under the waste management program that your cost and communication.

AUDIENCE PARTICIPANT: I think you've got a couple more questions.

AUDIENCE PARTICIPANT: That actually inspired during your discussion.

What's the speed of operation for this chemical -- in other words, how many little boxes will you put out a day? Are you going to stack up a thousand a day or one every two weeks or how is it going to happen that way? Can you tell me?

MR. NIXON: Yeah. I think that based on our calculations, we're looking at up to fourteen containers per day.

AUDIENCE PARTICIPANT: Per day.

MR. NIXON: Per day, but it's probably going to be something less than that. That's what we think our maximum production.

AUDIENCE PARTICIPANT: But your shipping rate may not be that high.

MR. NIXON: That's correct.

AUDIENCE PARTICIPANT: There was a concern about constriction of shipments at portals of entry where we have --

MR. NIXON: Exactly.

AUDIENCE PARTICIPANT: We have stacks of total boxes here.

MR. NIXON: I thought we had a slide on that.

MR. HAGEN: We do.

MR. NIXON: Yeah. The proposed shipments are three shipments per day for the chemical stabilization, so that would be six containers per day normal shipping program.

MR. HAGEN: For three years.

MR. NIXON: For three years.

AUDIENCE PARTICIPANT: That wouldn't jam us up.

MR. NIXON: It would accelerate the process. If we were able to increase the shipments, we could potentially accelerate the project. But that would be something that could be worked out.

AUDIENCE PARTICIPANT: Thank you.

AUDIENCE PARTICIPANT: Did I not hear you say you're going to drop these containers from three feet?

MR. HAGEN: The certification requires a test of dropping it three feet.

AUDIENCE PARTICIPANT: You know, the shear stress of concrete is 33 psi.

Do you know what's going to happen in three feet? There would be nothing left of it.

MR. NIXON: This package that we're using, the SEG container was tested under those conditions. It was dropped on a corner from that one meter height.

You know, you got to remember that you were -- you're exactly right on concrete, but this SEG container is primarily steel.

MR. HAGEN: It's got a lot of rebar in it.

AUDIENCE PARTICIPANT: That's not on here at all. That's why I couldn't figure it out.

MR. NIXON: They use -- they use almost a steel wool type reinforcement that's packed into the concrete.

AUDIENCE PARTICIPANT: But it says concrete.

MR. NIXON: It's reinforced concrete.

AUDIENCE PARTICIPANT: Very reinforced concrete.

FORMAL COMMENTS

MR. CLAIRE: Any other questions, guys?

MR. STEGNER: If there are no other questions, we can proceed to the formal public comments period. We'll take them at this time.

All we would ask is simply you say your name for purposes of the court reporter before offering your comments or questions, and then as I said, we will go into our silent mode now and simply listen to your comments, take them and we will respond to them in the formal responsiveness summary that we will provide to you.

Yes, sir.

AUDIENCE PARTICIPANT: Can't you surmise from our questions?

MR. STEGNER: You don't have to say anything, as I said. We can -- if you do want something responded to formally or you do want to go on the record formally.

MR. CLAIRE: Why don't we go ahead. If nobody else has got anything to say. Why don't we let some of the guests –-

AUDIENCE PARTICIPANT: I've got just one item. I think it's important to consider energy consumption for the national interest.

MR. BECHTEL: My comments are as a citizen. The Community Advisory Board may be commenting, so for the record, my name is Dennis Bechtel, 319 Encima Court, Henderson, Nevada, and a few items, and I'm going to read part of it and I'm just going to paraphrase part of it, and I have a copy for you.

There were several references in the -- in the documents that I had about, you know, the rural environment or the sparse population of Nevada, and, you know, the total program is going to be involved with -- you know, the disposal of the waste and the transport of the waste.

So my concern as a Nevadan is that southern Nevada is experiencing some fairly rapid growth, you know, over the last several decades, and I think that that will probably continue over the next -- who knows, until we run another of water, I guess.

But the concern I have is that the area is isolated now, and of course the test site will probably continue to be isolated, although parts of it are transitioning to other uses, that it's not -- it's kind of misleading to make statements like that in justifying, you know, say the project, I think the project needs to stand on its own merits.

The fact that although it's an isolated site, there's some concern about contaminants going off or, you know, at least migrating from where it was originally intended for the nuclear testing.

So I think -- I think the disposal needs to -- the citizens of Nevada need to be assured that -- that the concrete containers, which I also have some -- maybe some personal concern about over the long-term, that -- that the waste is able to is -- be isolated from the -- from the accessible environment or from the public.

And as a justification, I think you need to make that case -- I know I get a number of volumes of material. Maybe you did make it and I missed it, but I think that needs to be the -- the point that the waste is -- that the public is protected, both from the transportation of the waste, but also long-term because the material could be dangerous for a long period of time. So I want to make that item -- case.

The second, with regard to the preferred alternative -- and I think I spoke to this when you all came out here -- that yes, chemical stabilization probably has a longer history. It is easier to make.

There's been some problems of vitrification, but I think, you know, the -- there has been -- there has been that type of alternatives that have failed, and I'm thinking of the pondcrete at Rocky Flats.

I know you spoke to this. Each site is different, but it's very much something that needs process control, and I am certain that -- well, I guess the concern I have is that this is going to take place over time.

People are going to leave, and that a process control that's institutionalized in our operation so we don't run into another pondcrete situation, and the fact that there is a -- I also agree. I think vitrification, despite the fact it may not have the history, is probably a bit more stable form.

So that's -- not saying that chemical stabilization doesn't work, because it obviously works, too, but just so we don't run into situations like pondcrete.

I also have concern about the number of shipments. You indicated at our meeting last week that's pretty much the number of shipments are equivalent to historical shipments that you've had out to the test site.

One thing that sort of gets lost, though, is the fact that Nevada Test Site is -- will be the disposal site.

It's a disposal option for -- for all the sites in DOE complexes as I understand it, and not that everything's going to come here, but you will just be one of a number of waste streams.

So I think -- this isn't really your fault, but I think DOE nationally needs to look at the cumulative effects since we're the end of the funnel, so it's more than just your shipments. There will be other stuff coming, too.

Personally, and because I live in the Las Vegas Valley, I guess, but I'm gratified with your encouraging shippers, your northern/southern option.

A little unclear on what the time frames are between the north and -- whether you transition to the southern shipment. I guess depends on the weather, but I think the point of -- of concern I have as a citizen is that risk could be less risk, and it's my personal opinion that -- that we can debate about the danger of the material, but the fact that DOE should -- and apparently is -- Fernald, at least, considering that you shouldn't put the shipments into places where there's an opportunity for accidents.

I think -- I think we all recognize that Murphy's law, I know it's alive and we’ll and I think that it's my personal opinion that a more rural option is the way to prevent potential impact, particularly in our area. That's growing fairly rapidly.

So I'm glad to see that. We still have in the Las Vegas Valley, we're marking out our growth, and one of the areas that is growing is the southwestern section of the valley which coincides with the 160 route, and that's probably a split with the 160 and 127 route in California.

I do think there needs to be some sort of hazard analysis. Currently I don't -- 160 is a -- it's going to be better than it is maybe three or four years from now when some of those other developments get on-line. There's going to be a lot more construction traffic.

I mentioned routing.

The last item, state acceptance and community acceptance I think is very important. It's a little unclear in the documents.

You kind of mush everything together, and I know that's one of the -- I guess the ancillary alternatives, but I think nonetheless, there are -- all these other items are important, but we are the community -- southern Nevada is a community that's going to have to live with this.

So I think -- and your response here is good. I'm glad to see it, but -- and I hope you'll take our -- our concerns and questions into consideration because, you know, again, it's a -- it's a long-term commitment for folks in the area.

So those are my comments, and I have more formal, but ––

MR. STEGNER: If you can give me those, also.

MR. BECHTEL: Sure.

MR. CLAIRE: Anyone else want to say anything? Any one of the guests want to come forward and say anything? Come on up to a mic here.

MR. SHUDY: Dale Shudy. I live out in Pahrump. I had one question right off the bat.

Did you -- in your transportation costs, did you consider using intermodal or not?

And then while your testing of the containers sounds fairly good, I would assume at 50 miles an hour on a highway, that a collision would probably rupture the container.

I would just like to state for the record that Nye County as it sits now is not really prepared to handle that type of an accident.

I guess that's really all I have to say.

MR. CLAIRE: Anyone else want to make any comments or statements?

John. Go ahead.

MR. PHILLIPS: Just recently we had hearings about the workers that had their health impacted adversely and the Federal Government's going to reimburse them, and my concern is we've said that there's the health and safety issue and we just need to feel a little more comfortable that we're not going to repeat history by having ten, twenty years from now the same thing, a hearing where people are saying that their health was impacted.

So I think that we need to specifically learn from history and make sure we're not going to have a repeat situation and we're getting into robotics.

Maybe that may be something that needs to be looked at where we minimize the environmental impact on the human beings and that robotics -- robots get involved in this at the beginning and at the end of this shipment. That may be an area that you might want to look at.

MR. CLAIRE: Okay. Anybody else? Comments?

Don, do you want to say something?

MR. CLOQUET: Yes.

On behalf of the Native Americans, I would like to state that the Western Shoshone and their individual nations within the Great Basin region are opposed to all high-level and low-level nuclear waste issues, particularly the Yucca Mountain Project, which has been stated numerous times by my dear friend, Corbin Harney, who's a Western Shoshone Indian.

And I don't see him here today, but I certainly have a lot of respect for his thought and wisdom and foresight, and also I've also known the area myself, and I predict that the nuclear test site, 1,380 square miles, we're talking about various entities up there.

We have the proposed Kistler Aerospace Corporation that’s going to be located up on that mesa. We have low-level nuclear waste areas of the test site already that we get from various entities like Oak Ridge and other areas, perhaps from Idaho and Hanford, perhaps and other areas cause low-level nuclear waste coming in daily, and I'd like to repeat my friend Dennis that this is a tremendously growing area here in Las Vegas and I don't know if you -- if you want to go down to Spaghetti Bowl as I see at this moment, you’re probably going about 3 miles an hour.

The population of Las Vegas is 1,300,000 people and there are estimated 17,000 Native Americans that are residing in this area.

We all have really concerns of the transportation of low-level and high-level nuclear waste if it ever comes to southern Nevada here, and we have the Native Americans. Just for point of information, we have our own agenda with regard to this issue.

Thank you.

MR. CLAIRE: Dale, did you want to add something?

MR. SHUDY: It's not on the proposal. It's basically on the public hearing process.

As you may notice, I’m the only one here from Nye County. One of the only reasons for this appears to be that we received notice that the CAB meeting itself was canceled for this month.

Then a notice came out about a little over a week ago stating that this meeting would be February -- or Mar -- May 5th, which is this Friday, and it wasn't until yesterday that I actually learned this meeting is today.

That's kind of a short response period for people who live out in Nye County to get into a public hearing like this.

I hope that next time that we'll get a lot more warning of a public hearing.

Thank you.

MR. CLAIRE: Okay. Well, we're pretty well on schedule here.

MR. STEGNER: We thank you very much.

MR. HAGEN: We appreciate you coming out.

(The meeting concluded at 5:52 PM).

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STATE OF NEVADA]
COUNTY OF CLARK]

I, the undersigned, hereby certify that the foregoing proceeding was by me stenographically reported and that I have accurately and truthfully subscribed to time and place; that the foregoing proceeding is a full, true and complete record of said testimony; and that the subject or subjects of this transcript were given an opportunity to read and correct said transcript and to subscribe the same.

I further certify that I am not of counsel, attorney nor associated with either or any of the parties in the foregoing caption named, or in any way interested in the outcome of the cause discussed in said action.

IN WITNESS WHEREOF, I have hereunto set my hand this 19th day of May, 2000.

CCR No. 605

ATTACHMENT B.III
WRITTEN COMMENTS RECEIVED ON THE PROPOSED PLAN FOR REMEDIAL ACTIONS AT SILOS 1 AND 2

Joanne Wilson
43 Carousel Circle
Fairfield, Ohio 45014

April 21, 2000

Mr. Gary Stegner
Department of Energy
PO Box 53705
Cincinnati, Ohio 445253-8705
Fax 1-513-648-3073

RE: The proposed disposal of the contents of the K-65 silos at Fernald Facility, Ross, Ohio.

Dear Mr. Stegner:

We have talked several times concerning the issues of recycling the product material in the K-65 silos so in s that the radium contained in them can produce four alpha emitting isotopes now needed in new and successful treatment of cancer, such as leukemia and non-Hodgkin's lymphoma.

We also spoke of several alternate recycling methods. One was the removal of the waste product material completely from the site without site processing. This would involve the search for a facility and/or commercial company familiar with separation and processing of radioactive material to receive this material and process it to produce the isotopes.

This alternative would avoid the vitrification or chemical stabilization, cement-based process, now planned by the Department of Energy and would save the taxpayers many millions of dollars by avoiding these very expensive processes.

I feel this question of alternatives should be raised at this time, in light of the need and present use, by the medical community, for the four isotopes, namely Bismuth 213, Bismuth 212, Actinium 220 and Actinium 225, which can be produced from the radium 226 in the silo material.

Is the Department of Energy doing anything to preserve, retrieve, and recycle the approximately 10 pounds of *valuable* Radium 226 the in the K-65 silos?

I believe that the Fernald radium can provide isotope material for treating thousands of cancer patients and that this matter is so important that the Department of Energy arid other involved agencies should be exploring ways of recycling this radium instead of disposing of it in Nevada.

It is understandable that five years ago, in 1995, the great contribution that the Fernald radium would be able to make to the treatment of cancer was just beginning to be known. Now, it is known, and I believe that the Department of Energy and other agencies must make the retrieval and recycling of this radium a top priority, regardless of past plans or ideas.

I urge the Department of Energy and all other agencies to actively consider and pursue this matter.

Very truly,

Joanne Wilson

To:	Gary Stegner	From:	Gerald L. Gels
Company:	U.S. Dept. of Energy	Company:	Prof. Radiological Service
Department:	Public Information	Telephone:	(513) 661-9457
Telephone:	(513) 648-3153	FAX:	(513) 661-8654
FAX:	(513) 648-3073		
Date: 05-18-00	Time: 02:20 am	Pages (incl. Cover): 2	

Gary:

Attached are my comments fnr the Proposed Plan for Silos 1 & 2 Remedial Actions.

Jerry

Gerald L. Gels
2610 Morningdale Ct.
Cincinnati, OH 45211

Comments on Revised Feasibility Study/Proposed Plan for Silos 1 & 2 Remedial Actions

SPECIFIC COMMENT: In the "Revised Proposed Plan for Remedial Actions at Silos 1 and 2," March 2000, the Comparative Analysis Summary, Figure 7.2-1, contains two (of the 7 evaluated) parameters that seem, on the surface at least, to have a bias toward chemical stabilization. The category of "Long-Term Effectiveness and Permanence" is rated as "neutral." And the category of "Short-Term Effectiveness" is rated as favoring chemical stabilization.

In the "Long-Term" category, considering the long half-life of tire ^{226}Ra (1600 years), vitrification seems to be clearly favored. The immobilization of the radioactive constituents, particularly ^{226}Ra and ^{222}Rn, seems to definitely favor the vitrification option. In the "thousands of years" time frame, glass material should experience very little degradation, while the same cannot be said for cement products.

In the category of "Short-Term Effectiveness," the rating favors chemical stabilization, presumably due to the shorter projected time schedule for chemical stabilization. The radon release from either process will be very close to 100%. Note that the recommended method of removal of radon from drinking water supplies is aeration. While the vitrification alternative will result in a longer-term period of (potential) radon release, the lower amount of material handled per day should result in a lower daily dose to workers and nearby residents. Because of the reduced effectiveness for radon retention, the chemical stabilization alternative would not be favored in the short term, as the processing is carried out. This category seems to slightly favor vitrification or, at a minimum, be rated neutral.

GENERAL COMMENT: While the preceding specific comments may seem to favor the vitrification the philosophy of remedial actions for the K-65 residues should be examined. Up to 80% of the ^{226}Ra available for scientific and/or medical use in this country is contained in the two K-65 Silos. Vitrification would tie up those radium atoms in a glass matrix from which they would be very difficult to retrieve. While separation and concentration of the radium (approximately 4000 curies, equal to about 10 pounds of ^{226}Ra) from the bulk of the residues would be a difficult and expensive technological task, it is not at all beyond present day capabilities. The advantages of this approach are enormous, and certainly worthy of consideration. First, the radium would be available for use into the future. From a potential medical perspective alone, this 10 lb. of material could become an invaluable resource in the near future – a resource that we currently have no alternative for. Vitrification (or chemical stabilization, to a lesser extent) would make that material much more difficult to access. Second, the most radiologically dangerous nuclide in the K-65 Silos is ^{226}Ra. Concentrating and removing this radionuclide from the remaining residues will allow the disposal of those materials with much less concern for the release and possible pathway to the population for ^{226}Ra which has a very long biological and radiological half-life along with emission of alpha particle radiation. It could also possibly allow for recovery of the gold from the residues in a relatively uncontaminated state. Third, the removal of ^{226}Ra would take a large fraction of the gamma ray emitting radionuclides with it (^{214}Bi and ^{214}Pb). These gamma-emitting nuclides are the immediate progeny of ^{226}Ra and ^{222}Rn, and have relatively very short half-lives. So, all three of the major hazards in the K-65 Silos are associated with the 10 lb. of ^{226}Ra distributed through the contents of Silos 1 and 2. The possible intake of ^{226}Ra (with its extremely low Annual Limit), the direct radiation from radium and its short-lived progeny, and the seemingly uncontrollable release of ^{222}Rn will all be removed from the remaining residues and will be concentrated (and will thus be controllable) with the 10 lb. of ^{226}Ra.

GENERAL COMMENT: The remediation of the K-65 Silos, by whatever method is selected, needs to include environmental health physics analysis focusing on all the K-65 radionuclides, but particularly on $_{226}Ra$ and releases of ^{222}Rn. Current real-time radon data from FEMP and Ohio EPA indicate that off-site radon concentrations – at the west fence of the FEMP and at Crosby School, 2 miles away – are significantly greater than background. These concentrations have yet to be acknowledged as being different than natural background, although September 1999 outdoor concentrations at a distance of 2 miles from the K-65 Silos averaged 1.3 pCi/L, with many individual hour-long averages at concentrations equal to or greater than 3 pCi/L. The level of 3 pCi/L is ten times higher than the average background radon concentration expected for this part of the country, and the average for the month is more than four times the expected background concentration. The failure to recognize and address this issue indicates the possibility that proposed radon control measures for Silos 1 – 3 removal and Accelerated Waste Retrieval may need re-evaluation by experts in those areas. To date, neither the Critical Analysis Team (CAT) nor Fernald engineers have demonstrated sensitivity to these issues.

Gerald L. Gels, CHP
2610 Morningdale Ct.
Cincinnati, OH 45211
(513) 661-9457

Mr. Kenneth A. Moore
4470 Classic Drive
Cincinnati Ohio 45241
(513) 489-4470
e-mail – kmoore2@cinci.rr.com

May 11, 2000

U. S. Department of Energy
% Mr. Gary Stegner
DOE-FEMP Public Affairs Officer
P.O. Box 538705
Cincinnati, Ohio 45253-8705

RE: Silos 1 & 2 Public Hearing

As a member of the Fernald Citizens Advisory Board I was invited to attend a Public Hearing on April 25, 2000 conducted by the U. S. Department of Energy (DOE) to receive comments pertaining to the Silos 1 and 2 project. There were two speakers at the hearing, Dr. Joanne Wilson, Physician and Mr. Jerry Gels, Health Physicist, who presented information about the possible positive health benefits of the radium stored within Silos 1 and 2, the largest single source of radium in the world. They presented information that indicated studies are currently being conducted and funded by U.S. Government, using radium which might lead to a treatment for certain types of cancer with reduced side effects. They indicated that the proposed treatment of the Silos 1 and 2 materials would render the radium useless for future bio-medical purposes.

The DOE has an opportunity and a responsibility to mankind to fully evaluate and fund research into the bio-medical benefits of radium before the Silos 1 and 2 materials are permanently lost for that purpose. If we fail to act in a responsible manner and dispose of the radium and then discover that radium is a bio-medical asset, the costs, both monetary and environmental would be significantly higher for new radium production and would far outweigh the cost of storing the existing radium in a form that would not degrade it for bio-medical purposes.

Everyone involved with the Fernald Environmental Management Project has a mission of remediation for the site through decontamination and dismantlement. However, we should not have such a narrow view as to overlook the possible bio-medical benefits of radium, which could provide significant health benefits for society. Will the legacy of Fernald be forty years of cold war activities and fifteen years of cleanup costing billions of dollars or the use of cold war radium for world wide bio-medical cancer treatment in the 21st century?

How can the radium be extracted for bio-medical purposes while maintaining a realistic timetable for the safe removal of the other Silos 1 & 2 materials? It is being proposed that the Silos 1 & 2 materials be moved to a Transfer Tank Area and placed into metal storage tanks prior to the recommended chemical stabilization-cement alternative. The November 1999 Silos Report indicates that there is as much as four and one-half years (54 months) available for extraction of radium prior to the start of operations. It would appear that a private commercial organization could implement a radium extraction process within that time frame. Even if the time frame for commencing operations was extended by a year or two, the benefits would far outweigh the incremental time lost.

The single most responsible action that DOE should take would be to fully evaluate the use of Radium from silos 1 & 2 for bio-medical purposes prior to implementing the *Revised Proposed Plan for Remedial Actions at Operable Unit 4 (Silos 1 & 2)*. This would include preplanning to identify private commercial operations.

The intent of this letter is to assist others who are actively trying to identify radium as a treatment for cancer and to save a vital resource for that treatment.

Sincerely,

Kenneth A. Moore

3686 Cincinnati-Brookville Road
Hamilton, Ohio 45013-9011

May 5, 2000

Mr. Gary Stegner
U. S. Department of Energy
Fernald Environmental Management Project
P.O. Box 538705
Cincinnati, Ohio 45253-8705

SUBJECT: PUBLIC COMMENTS ON PROPOSED PLAN (CHEMICAL STABILIZATION VS. VITRIFICATION) FOR REMEDIAL ACTIONS AT SILOS 1 AND 2, DOE-FEMP DUE MAY 18, 2000

Dear Mr. Stegner:

We conclude that chemical stabilization of subject toxic materials should be the preferred treatment alternative because it meets the threshold criteria and provides the best overall balance of tradeoffs compared to vitrification.

The above conclusion was influenced by information from the following three sources:

1. Silos update meeting on April 25, 2000 (6:30-8:30 p.m.) at the Alpha Building, Room D,10967 Hamilton-Cleves Highway, Harrison, Ohio.

2. Revised proposed plan for remedial actions at Silos 1 and 2, Report #40700-PL-0001 DOE-FEMP dated March, 2000.

3. Executive Summary Revised Feasibility Study for Silos 1 and 2, Report #40730-RP-0001.

Because there is no natural safety barrier which would prevent toxic particulates, fumes, gases or vapors from being quickly transported from FEMP operations by average 9 MPH wind speed to its nearest residential neighbors in a matter of minutes, engineering controls must be designed and maintained to prevent any off-site migration of toxic chemicals. Negative air pressure engineering enclosures should be employed and maintained to assure that people on and off site do not breathe in any dust or toxic chemicals. Safety and health of the FEMP workers and the public must not be compromised.

Sincerely,

J. E. Walther

J. E. Walther

REVISED PROPOSED PLAN FOR REMEDIAL ACTIONS AT SILOS 1 AND 2 (40700-PL-001)

Statement of Dennis Bechtel
319 Encima Court
Henderson, Nevada

May 3, 2000

REVISED PROPOSED PLAN FOR REMEDIAL ACTIONS AT SILOS 1 AND 2 (40700-PL-001)

Statement of Dennis Bechtel
Resident of Henderson, Nevada

My name is Dennis Bechtel. I am a resident of Henderson, Nevada. Although I am a member of the Nevada Test Site-Community Advisory Board my comments are as an individual and don't represent the views of the Nevada Test Site Community Advisory Board. I appreciate the fact that Fernald is holding a public hearing in Nevada on this issue. Too often public hearings and the review of public documents do not include all parties that would be impacted by a project. In this case there is a site being remediated and a site that is accepting the waste. Both parties should be party to reviewing the proposed plan.

1. **The Nevada Test Site (NTS) setting.** The Proposed Plan notes that the Nevada Test Site is located *"in a sparsely populated, arid environment with a low potential for leachate generation . . . migration, . . ."*. On the bottom of Page 7-6 of the Summary Proposed Plan it also alludes to the isolation of Southern Nevada as being a reason *in the event of long-term degradation of engineered features or loss of institutional controls . . . ensure the protectiveness of human health and the environment is maintained*.

Southern Nevada has, of course, experienced rapid growth over the past several decades, a trend that it appears will continue in the future. Because the County is becoming increasingly urbanized, however, it should be noted that the communities that could be affected by issues such as the transportation of the nuclear waste are no longer small and isolated. Clark County, for example, has a population that exceeds 1.4 million.

Accordingly, the increasing numbers of Southern Nevadans in the future and the potential risk involved could make comments such as these inaccurate. Likewise, recent monitoring information seems to provide evidence that the migration of radioactivity from areas of weapons testing may be more extensive then previously thought.

The rationale for storage of radioactive waste at the NTS should not be supported because of the isolation of Southern Nevada (which is changing rapidly) but rather because the disposal facility will be designed to ensure that the resident population potentially impacted will be protected.

2. **The Preferred Treatment Alternative**. Chemical Stabilization (CS) is the preferred treatment alternative for treatment and disposal of the Silos 1 and 2 wastes. The CS alternative (CS, as we understand it, is now one alternative) is preferred to the Vitrification (VT) alternatives for a number of reasons including experience in use, lower cost, lower toxicity, health and safety concerns, and lower O & M costs. While the rationale presented seems reasonable we're aware, however, that a similarly stabilized waste material, *Pondcrete* [sic] at the Rocky Flats Department of Energy (DOE) facility experienced problems in maintaining integrity. Vitrification although more complex in development seems to demonstrate more long-term integrity.

   The Plan should document how the Chemical Stabilization process proposed at Fernald will, if selected, avoid the degradation that occurred at the Rocky Flats facility? Will it maintain its integrity over the life of the risk to the public and environment. Also, it is uncertain in the documents whether the CS material meet the State of Nevada Waste Acceptance Criteria?.

3. **Number of shipments.** The number of shipments for the preferred CS alternative is considerably higher than that for the VT option. At a recent meeting DOE/Fernald personnel noted that the proposed Silo shipments to the NTS are equivalent to current shipment levels. The NTS, however, was recently named as one of two sites that can receive low-level and mixed low-level radioactive waste from all DOE sites throughout the

Complex. Fernald thus will be only one of many sites transporting waste to the NTS. As a number of DOE plans this avoids discussion of cumulative impacts- e.g., the Fernald shipments plus those from other sites using the NTS.

Since the majority of Fernald shipments may occur during the same time frame as shipments from other sites, DOE needs to evaluate these shipments in a cumulative sense. In addition to listing shipments from Fernald, DOE must provide information to enable the public to understand the totality of shipments from DOE sites to the NTS to enable the public and governments to understand how these shipments add to the risk.

4. **Routing of nuclear waste shipments**. Transportation information in the Planning documents indicated that truck shipments carrying Silos 1 and 2 wastes will continue to utilize the Northern and Southern routing options described in the Proposed Plan. DOE/Fernald continues to be responsive to the concerns of Southern Nevadans associated with transporting the Silos waste through a rapidly growing area with congestion and, therefore, a greater potential for accident.

   While it appears that DOE/Fernald is actively involved in encouraging certain routes for the transportation of the waste to be used, it is unclear why, based on the experience of the Waste Isolation Pilot Project (WIPP) with the transportation of waste, that routes can be specified in contracts. Also needing to be noted is how DOE/Fernald intends on monitoring the shipments to ensure that their carriers comply with the routing designations and Department of Transportation criteria. Tourism is, of course, Nevada's bread and butter. Given the fact that rightly or wrongly the public does not distinguish between types of low-level radioactive waste, it is important that DOE avoid situations that could potentially adversely impact our economy and quality of life.

5. **State Acceptance/Community Acceptance**. The Program Planning document needs to describe how the *State Acceptance and Community Acceptance* criteria are defined, analyzed and weighted by DOE in selecting a preferred alternative.

Community acceptance, of course, should be more than the statements of those attending public hearings. It should be the total record of meetings with communities and stakeholders. The record of community acceptance should be derived from a number of sources and not merely the results of one hearing.

Thank you again for convening the meeting in Southern Nevada. We look forward to Fernald and the Nevada Operations office to considering my comments.

2437 LOSEE ROAD
NORTH LAS VEGAS, NV 89030
PH: 702/633-5300, EXT. 232
FAX: 702/633-5200
E-MAIL: NTSCAB@aol.com

COMMUNITY ADVISORY BOARD

Fax

To:	Gary Stegner	**From:**	Phil Claire
Pages:			
Date:	05/18/00		
Re:	Comments on Revised Proposed Plan for Remedial Actions at Silos 1 and 2	**cc:**	

Herewith is the Comments from the Nevada Community Advisory Board and the Low-Level Waste Committee on the Revised Proposed Plan for Remedial Actions at Silos 1 and 2 (40700-PL-001) – Fernald, Ohio.

If there are any questions, please contact us.

Regards,
Phil Claire
Chair, NTS CAB

Community Advisory Board

A Site-Specific Environmental Management Advisory Board
Chartered Under the U.S. Department of Energy

May 18, 2000

Mr. Gary Stegner
U.S. Department of Energy
Fernald Area Office
P.O. Box 398705
Cincinnati, OH 45239-8705

Subject: **Comments from the (CAB, LLW Committee) on the Revised Proposed Plan for Remedial Actions at Silos 1 and 2 (40700-PL-001) – Fernald, Ohio**

Dear Mr. Stegner;

Attached are comments from the Nevada Test Site Community Advisory Board (NTS-CAB) to the ***Revised Proposed Plan for Remedial Actions at Silos 1 and 2 (40700-PL-001)*** developed by the Department of Energy (DOE) for remediation activities at the Fernald Environmental Management Project (FEMP) in Ohio.

We have appreciated the opportunity to comment on the *Revised Proposed Plan* and the efforts expended by the Femald project office staff to meet with NTS-CAB members and public on issues associated with the Plan. The NTS-CAB and Nevada community and Fernald personnel, of course, have collaborated on issues of mutual concern over the past several years. We hope that this relationship and dialogue will continue on future issues.

Thank you again for the opportunity to respond. If there are questions please contact us.

Sincerely,

Phil Claire, Chair
Nevada Test Site Community Advisory Board
(Chair LLW/Transportation Subcommittee)

cc: Carl Gertz
Kevin Rohrer
CAB - Fernald

2437 Losee Road
North Las Vegas, NV 89030-4233

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Comments of the
Nevada Test Site Community Advisory Board *(or Low-Level Radioactive Waste Transportation Committee)* to the *Revised Proposed Plan for Remedial Actions at Silos 1 and 2* (40700-PL-001) – Fernald, Ohio

The following are comments by the Nevada Test Site Community Advisory Board to the *Revised Proposed Plan for Remedial Actions at Silos 1 and 2* (40700-PL-001)

1. **The Nevada Test Site (NTS) setting.** The *Revised Proposed Plan* notes that the NTS is located "*in a sparsely populated, arid environment with a low potential for leachate generation*.. [and pollutant] *migration, ...*" . On the bottom of Page 7-6 of the Summary of the *Revised Proposed Plan* it is also noted that the isolation of Southern Nevada as being a reason to select the NTS location " *in the event of long-term degradation of engineered features or loss of institutional controls . . . [that the isolation would] ensure* [that] *the protectiveness of human health and the environment is maintained*."

   What is not apparent in reading the document is that Southern Nevada has become a major population center. Rapid growth in Southern Nevada has been experienced over the past several decades, a trend that is projected to continue well into the future. The Amargosa Valley and Pahrump in Nye County adjacent to the NTS are experiencing unprecedented growth. The population of Clark County, through which of many shipments of radioactive waste from Fernald over the years, is projected to grow from 1.3 million in 1999 to an estimated 2.5 million in 2020. The potential risk to increasing numbers of Southern Nevadans from all activities associated with the project, including the transport of the waste, needs to be better described in the report.

   The storage of radioactive waste at the NTS should not be justified because of the isolation of the sire but, rather, because the disposal facility has been designed to ensure that contaminants will not impact residents and the environment in Southern Nevada

2. **The Preferred Treatment Alternative.** Chemical Stabilization (CS) is the preferred treatment alternative for Silos 1 and 2 wastes for a number of reasons including experience in use, lower cost, lower toxicity to workers as well as lower operations and maintenance costs. While there is a rationale to justify its selection, we are also aware that there have been problems with premature degradation from similarly stabilized materials.

   The Proposed Revised Plan should include documentation describing how the Chemical Stabilization process proposed would avoid degradation. Related questions would include *how the CS would compare to VT in maintaining its integrity over the period of danger of the waste (on-site) and as a result of a highway accident. It is also unclear in the Plan whether the CS material will meet the DOE/NV Waste Acceptance Criteria (WAC).*

3. **Number of shipments.** The total number of shipments specified for the preferred CS alternative are almost double the number noted for the VT option. With the greater number of shipments the potential exists for more accidents with the CS alternative and more risk potential to the public.

   While a case has been made that CS is safer for workers than the VT alternative, one could also be made that twice the number of shipments on the highway would increase the risk to the public adjacent to transportation routes. More shipments provide the potential for additional accidents, as an example. While the NTS CAB obviously supports minimal risk to Fernald residents and workers we also must consider minimizing risk to Nevada residents and visitors as well. The VT alternative with fewer shipments will from a transportation perspective provide lower risk not just to Nevadans but others on transportation routes. We understand that several stakeholders at the Fernald site were also supportive of the VT alternative for similar reasons. There is no discussion of the use of rail in the Plan. Is this an option as well? The use of rail could reduce the total number of shipments and thereby also present lesser risk.

4. **Cumulative impacts.** The NTS was recently named as one of two sites eligible to receive low-level and mixed low-level radioactive waste from all DOE sites being remediated. Fernald will, therefore, be only one of many DOE sites transporting radioactive waste to the NTS.

   Fernald will be transporting waste at the same time that other DOE sites will be shipping to the NTS. While not necessarily Fernald's problem this further substantiates why DOE needs to evaluate the potential cumulative affects of shipments from all sites being remediated. While Nevada's, citizens and communities, at the "end of the funnel " for these *shipments, will be offered the potential of experiencing more impacts, this, also will be a nationwide issue.*

5. **Routing of nuclear waste shipments.** The Proposed Revised Plan notes that truck shipments carrying Silos 1 and 2 wastes will continue to utilize the "Northern" and "Southern" routes currently being utilized. DOE/Fernald, therefore, continues to be responsive to the concerns of Southern Nevadans regarding the transportation of the Silos waste through our rapidly growing communities. Avoiding congestion and the greater potential for accident would be in the interest of DOE as well as Nevada's citizens..

   While it appears that DOE/Fernald is actively involved in encouraging certain routes for the transportation of the waste to be used, it is unclear why, based on the experience of the Waste Isolation Pilot Project (WIPP) with the transportation of its waste, routes cannot be *specified by DOE to shippers. The plan should also express how DOE/Fernald intends on monitoring on-going and future shipments to ensure that carriers are actually complying with Department of Transportation routing regulations.*

6. **State Acceptance/Community Acceptance.** The Proposed Revised Plan needs a description of how the *State Acceptance and Community Acceptance* criteria are defined, analyzed and weighted by DOE in selecting a preferred alternative.

   Community acceptance should include the history of meetings, correspondence, interactions with stakeholders conducted by DOE on this topic and not be solely from the public hearings.

7. **Equity.** The naming of the NTS as one of two sites eligible for accepting low-level and mixed low-level radioactive waste, as noted earlier, also raises a number of equity-related questions. Nevada, by accepting waste is improving the health, safety and environment of residents and workers at other DOE sites. This also provides evidence of Nevada's further service to the nation on an important nuclear issue. In addition to the benefit to the nation in providing this service, there is also the added burden of stewardship and the associated future costs.

   Fernald, and other sites, in remediating their sites adds to the burden of the NTS and Nevadans. To restore equity as well as to ensure that future stewardship costs are defrayed, it is important that cost savings at sites being remediated be made available to the NTS to defray future stewardship costs.

8. **Energy Consuption.** Analyses of energy consumption for the various project alternatives is required under the National Environmental Policy Act of 1969. In selecting the disposal alternative and transportation mode (truck and/or rail) and routing, the alternative with the minimum energy consumption must seriously be considered by the U.S. Department of Energy, U.S. Department of Transportation, and carrier(s) as the preferred alternative.

Public Meeting Evaluation/Comment Card
Silos 1 & 2 Proposed Plan for Remedial Actions
May 3, 2000

The U.S. Department of Energy and Fluor Fernald would like your feedback about this meeting. Please complete this evaluation form to help us better serve your needs. Thank you.

1. The level of information presented tonight was:

   ____ Not detailed enough

   _✓_ Adequate

   ____ Too detailed

   Please explain:

2. The presentation made use of a video explaining the Proposed Plan. Was this approach:

   ____ Very useful

   _✓_ Somewhat useful

   ____ Not helpful at all

   Please explain:

3. I better understand the Proposed Plan for Remedial Actions at Silos 1 and 2 after hearing this presentation.

   ____ Strongly Agree

   _✓_ Agree

   ____ Disagree

   Please explain:

4. Please list specific questions or concerns you have about the Silos 1 and 2 Proposed Plan for Remedial Actions:

   Minimize total energy consumption
   Complete in shortest time, at lowest costs,
   and lowest overall risk, including worker risk.
   Intermodal transportation should be considered,
   and use the Vegas Beltway for direct
   movement to NTS.

-Continued on reverse side-

5. Please provide other comments about this meeting:

Make a decision, and let us get the project done.

6. If you would like a Fernald representative to contact you to clarify information presented tonight please provide the following information:

Name: Kenneth M. Reim

Affiliation: DOE/NTS CAB

Daytime Phone: (702) 254-2764

Question/Concern

For more information about the Silos Project, please visit DOE's Public Environmental Information Center, 10995 Hamilton-Cleves Highway, Harrison, Ohio, 45030 or visit our Web site at www.fernald.gov.

Public Meeting Evaluation/Comment Card
Silos 1 & 2 Proposed Plan for Remedial Actions
May 3, 2000

The U.S. Department of Energy and Fluor Fernald would like your feedback about this meeting. Please complete this evaluation form to help us better serve your needs. Thank you.

1. The level of information presented tonight was:

   _____ Not detailed enough

   _X_ Adequate

   _____ Too detailed

   Please explain: Very Good

2. The presentation made use of a video explaining the Proposed Plan. Was this approach:

   _____ Very useful

   _X_ Somewhat useful

   _____ Not helpful at all

   Please explain: It's like watching a video of Las Vegas, but not like being in Las Vegas

3. I better understand the Proposed Plan for Remedial Actions at Silos 1 and 2 after hearing this presentation.

   _X_ Strongly Agree

   _____ Agree

   _____ Disagree

   Please explain:

4. Please list specific questions or concerns you have about the Silos 1 and 2 Proposed Plan for Remedial Actions:

I continue to hold the opinion ~~of~~ that use of the 160 route when the history of transportation through Las Vegas has been without incident whereas transport via 160 increases the transportation risk and exposes 1st responders who are not as knowledgeable [illegible] Las Vegas emergency personnel

Continued on reverse side

5. Please provide other comments about this meeting:

It is sad to see that no members of the "PUBLIC" have the time or interest to participate.
I appreciate Fernald's efforts to deal with Nevada in an open/public fashion.

R. Novella May 3-20[illegible]

6. If you would like a Fernald representative to contact you to clarify information presented tonight please provide the following information:

Name: ______________________________

Affiliation: ______________________________

Daytime Phone: ______________________________

Question/Concern ______________________________

For more information about the Silos Project, please visit DOE's Public Environmental Information Center, 10995 Hamilton-Cleves Highway, Harrison, Ohio, 45030 or visit our Web site at www.fernald.gov.

Public Meeting Evaluation/Comment Card
Silos 1 & 2 Proposed Plan for Remedial Actions
May 3, 2000

The U.S. Department of Energy and Fluor Fernald would like your feedback about this meeting. Please complete this evaluation form to help us better serve your needs. Thank you.

1. The level of information presented tonight was:

   ____ Not detailed enough

   _✓_ Adequate

   ____ Too detailed

   Please explain:

2. The presentation made use of a video explaining the Proposed Plan. Was this approach:

   _✓_ Very useful

   ____ Somewhat useful

   ____ Not helpful at all

   Please explain:

3. I better understand the Proposed Plan for Remedial Actions at Silos 1 and 2 after hearing this presentation.

   ____ Strongly Agree

   _✓_ Agree

   ____ Disagree

   Please explain:

4. Please list specific questions or concerns you have about the Silos 1 and 2 Proposed Plan for Remedial Actions:

____

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Continued on reverse side-

5. Please provide other comments about this meeting:

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6. If you would like a Fernald representative to contact you to clarify information presented tonight please provide the following information:

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Affiliation: ___________________________________

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Question/Concern________________________________

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1. The level of information presented tonight was:

X Not detailed enough

____ Adequate

____ Too detailed

Please explain: VT IS PRESENTED AS A VIABLE PROCESS BUT PAST EXPERIENCE SUGGESTS OTHERWISE. THE DIFFICULTY OF VT NEEDS TO BE PRESENTED.

2. The presentation made use of a video explaining the Proposed Plan. Was this approach:

____ Very useful

X Somewhat useful

____ Not helpful at all

Please explain:

3. I better understand the Proposed Plan for Remedial Actions at Silos 1 and 2 after hearing this presentation.

____ Strongly Agree

X Agree

____ Disagree

Please explain:

4. Please list specific questions or concerns you have about the Silos 1 and 2 Proposed Plan for Remedial Actions:

—

Continued on reverse side

5. Please provide other comments about this meeting:

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6. If you would like a Fernald representative to contact you to clarify information presented tonight please provide the following information:

Name: ____________________________________

Affiliation: __________________________________

Daytime Phone: ________________________________

Question/Concern_______________________________

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1. The level of information presented tonight was:

   ____ Not detailed enough

   _✓_ Adequate

   ____ Too detailed

   Please explain:

2. The presentation made use of a video explaining the Proposed Plan. Was this approach:

   _✓_ Very useful

   ____ Somewhat useful

   ____ Not helpful at all

   Please explain:

3. I better understand the Proposed Plan for Remedial Actions at Silos 1 and 2 after hearing this presentation.

   ____ Strongly Agree

   _✓_ Agree

   ____ Disagree

   Please explain:

4. Please list specific questions or concerns you have about the Silos 1 and 2 Proposed Plan for Remedial Actions:

   ____

   ____

   ____

   ____

Continued on reverse side-

5. Please provide other comments about this meeting:

Native Americans, live in Southern Nevada, are opposed to All Nuclear Waste, been sent To The N.T.S.

6. If you would like a Fernald representative to contact you to clarify information presented tonight please provide the following information:

Name: ______

Affiliation: ______

Daytime Phone: ______

Question/Concern ______

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Public Meeting Evaluation/Comment Card
Silos 1 & 2 Proposed Plan for Remedial Actions
May 3, 2000

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1. The level of information presented tonight was:

   ____ Not detailed enough

   ____ Adequate

   ____ Too detailed

   Please explain:
   What I could hear!

2. The presentation made use of a video explaining the Proposed Plan. Was this approach:

   ____ Very useful

   __✓__ Somewhat useful

   ____ Not helpful at all

   Please explain:

3. I better understand the Proposed Plan for Remedial Actions at Silos 1 and 2 after hearing this presentation.

   ____ Strongly Agree

   ____ Agree

   ____ Disagree

   Please explain:
   working on understanding

4. Please list specific questions or concerns you have about the Silos 1 and 2 Proposed Plan for Remedial Actions:

   ~~[illegible]~~ Very worried about them and hope all goes well! Measure twice and cut once - understand my meaning?

Continued on reverse side

5. Please provide other comments about this meeting:

Wish I could hear I get very upset!

6. If you would like a Fernald representative to contact you to clarify information presented tonight please provide the following information:

Name: Carol Schuen

Affiliation:

Daytime Phone:

Question/Concern

For more information about the Silos Project, please visit DOE's Public Environmental Information Center, 10995 Hamilton-Cleves Highway, Harrison, Ohio, 45030 or visit our Web site at www.fernald.gov.

Public Meeting Evaluation/Comment Card
Silos 1 & 2 Proposed Plan for Remedial Actions
April 25, 2000

The U.S. Department of Energy and Fluor Fernald would like your feedback about this meeting. Please complete this evaluation form to help us better serve your needs. Thank you.

1. The level of information presented tonight was:

   _X_ Not detailed enough

   ___ Adequate

   _X_ Too detailed

   Please explain:

2. The presentation made use of a video explaining the Proposed Plan. Was this approach:

   _X_ Very useful

   _X_ Somewhat useful

   ___ Not helpful at all

   Please explain:

3. I better understand the Proposed Plan for Remedial Actions at Silos 1 and 2 after hearing this presentation.

   ___ Strongly Agree

   _X_ Agree

   _X_ Disagree

   Please explain:

4. Please list specific questions or concerns you have about the Silos 1 and 2 Proposed Plan for Remedial Actions:

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Continued on reverse side-

5. Please provide other comments about this meeting:

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6. If you would like a Fernald representative to contact you to clarify information presented tonight please provide the following information:

Name: ______________________________________

Affiliation: __________________________________

Daytime Phone: _______________________________

Question/Concern _____________________________

For more information about the Silos Project, please visit DOE's Public Environmental Information Center, 10995 Hamilton-Cleves Highway, Harrison, Ohio, 45030 or visit our Web site at www.fernald.gov.

Address Leiper
5357 Spencer
Las Vegas NV 89119.

Mr. Gary Stegner
Public Information Officer
U.S. Department of Energy
Fernald Environmental Management Project
P.O. Box 538705
Cincinnati, OH 45253-8705

fold here

COMMENT SHEET

DOE is interested in your comments on the cleanup alternatives being considered in the Revised Feasibility Study/Proposed Plan for remedial actions at Silos 1 & 2. Please use the space provided below to write your comments, then fold, staple or tape, and mail this form. We must receive your comments on or before the close of the public comment period on May 18, 2000. If you have questions about the comment period, please contact Gary Stegner, the DOE Public Information Officer at Fernald, at (513) 648-3153.

Gary: 5-9-2000

The presentation yesterday here at the DOE Bldg. last afternoon was clear - understandable & well organized.

I feel that the study - testing etc thus far conducted is sound.

My only thought would be to further study rail/truck combination - I recognize problems of a transfer site/equipment etc & personally am not worried about trucks passing through HV but know the public attitude & wonder if potential opposition could be reduced by at least, when time is right, to advise public that alternatives are being [illegible]

TECO

INTERNATIONAL Glass Plant Engineers & Contractors

May 17, 2000

Mr. Gary Stegner
U.S. Department of Energy, Fernald Area Office
P.O. Box 538705
Cincinnati, OH 45253-8705

Subject: Comment on FDF Proposed Plan/Feasibility Study for Remedial Actions at Silos 1 and 2

We appreciate the opportunity to comment on the Proposed Plan and Feasibility Study for Remedial Actions at Silos 1 and 2. Although we have concerns about the choice of technology, we have been impressed with the effort to inform your stakeholders and to elicit comment.

We feel that the data and the analysis do not support the decision for Chemical Stabilization as the preferred treatment. Both the strengths of vitrification and the problems with chemical stabilization seem to have been understated. These concerns primarily focus on the following issues:

- The placing of reliance on the disposal container and the disposal site for protection of human health and the environment from the chemically stabilized waste, rather than the properties of the wasteform itself.

- The understating of difficulties experienced with the chemical stabilization technologies under the controlled conditions of the POPT demonstration, yet giving a favorable assessment of chemical stabilization based on extrapolated, undemonstrated, “results”.

- The lack of optimization of the container scenario for the VIT 1 technology which reduces the benefit of its inherent volume reduction.

- The favoring of chemical stabilization in the areas of process flexibility and schedule attainment while disregarding the commercial experience in glass furnace design, construction and operation of the VIT1 vendor.

- The favoring of chemical stabilization technologies based on experience on dissimilar waste materials, while disregarding the extensive commercial

Toledo Engineering Co., Inc.
3400 Executive Parkway
P.O. Box 2927
Toledo, Ohio 43606-0927 U.S.A.
Telephone: 419-537-9711
Fax: 419-537-1369

experience in glass furnace design, construction, and operation on non-waste, but more similar, materials by the VIT1 vendor.

1. **Overall Protection of Human Health and the Environment:**

The Feasibility Study places heavy reliance on the packaging of the chemically stabilized wasteform and management of the storage site, especially when the stored waste is considered to require controlled storage for 1000 years. For cases of surface disposal (versus HLW repository disposal where protection is ensured by depth of disposal), long-term management and/or control cannot be guaranteed. The actual waste performance under such conditions should be a significant discriminator between the two technologies. The vitrified product possesses greater long-term durability and radon mitigation (10^6 times better) compared to the cement-stabilized product itself. The potential to provide longer protection to health and the environment seems to have been ignored.

2. **Reduction of Toxicity, Mobility, or Volume through Treatment:**

a) The large volume reduction offered by the VIT1 process should have been given more weight. The packaged disposal volume from VIT1 represented only 24-26% of the volume predicted for the Chemical Stabilization technologies.

In spite of the greatest volume reduction, VIT1 ended up with more shipments than the fritted waste form of VIT2. Had FDF worked with us in optimizing our disposal/shipment package, we likewise would have had the fewest packages shipped. Instead, we continued under the expressed desire by FDF to minimize the wasteform volume. VIT1 should be reconsidered assuming use of the simpler, less expensive fritting.

The VIT1 technology excelled in this area based on the perceived desire by FDF to minimize the wasteform produced. Based on the success in reducing the volume of treated waste, and the demonstrated performance of the wastes, the vitrification technologies should be ‘Strongly Favored’.

b) The amount of secondary waste generated by vitrification technologies is very similar to that from the chemical stabilization. These differences are insignificant in terms of the total waste generated, and do not justify a 'Favorable' rating for the stabilization technologies.

3) Short-term Effectiveness- Worker Risk:

The down rating of VIT1 due to potential risk of electrical shock and from working at heights ignores Toledo Engineering's experience in providing systems to the glass industry with exemplary safety records. Our glassmaking systems are risk-engineered to force personnel safety. While we applaud making your work force a part of your decision-making process, it is important that something not be considered "risky" just because it is not typical of the DOE processes. Certainly the excellent safety record at Fernald while working with the pervasive danger of radioactivity exposure is a testament that potential risk can be controlled and does not necessarily translate into injuries.

4) Short-term Effectiveness - Time to Achieve Protectiveness:

The time to completion assigned by FDF for VIT1 is 3 times that proposed by Envitco and is far too conservative. The length of time to operation start is governed by assets applied and project management; not strictly by complexity of the task or system, and should be the same as for the cement-based system. Toledo Engineering is a commercial design and build firm serving the commercial glass industry and is used to increasingly fast-track projects.

Treatment time could reduced by increasing the melter size and such an increase would have minimal effect on the total project cost. However, this approach was proposed to FDF, who refused any efforts to provide added capacity to shorten the treatment time. In the end, the perceived 'lack' of capacity and ability to accelerate schedule was considered a deficiency for VIT1.

5) Long-term Effectiveness:

The Feasibility Study places heavy dependence on the packaging of the chemically stabilized wasteform and management/maintenance of the storage to accomplish the long-term effectiveness. This should not be a acceptable basis for control, considering the long-term risks associated with the wasteform (long half-life radionuclides, long-term dose, continued radon emanation). Control of the storage site was stated by FDF as required for 1000 years. This seems quite unlikely to be possible.

The vitrifled wasteform possesses much greater long-term durability and radon mitigation 10^5 to 10^6 times better than the actual cement-stabilized product.

6) Implementability:

Judgement of the VIT1 implementability should be based on the in-depth commercial experience of Toledo Engineering in addition to hazardous and radioactive glass experience. Use of high-level radio active waste vitrification examples should not be compared as analogous to low-level grout examples. Worldwide, hundreds of production glass furnaces run 24 hours/day, 7 days/week for 5 to 15 years without a shutdown. Evaluation of VIT implementability based on high-level waste demonstrations, versus evaluation of grout implementability for low level and hazardous waste demonstrations is unfair, and biases the evaluation to down-rate vitrification. The inappropriateness of the argument as presented is best exemplified at the Hanford DOE site, where grout stabilization was canceled and replaced with vitrification, due to confidence in the process and wasteform.

Operability and controllability of the melter were questioned since some of the important properties of the glasses were not measured directly during operation. The model for glass composition and melter performance developed during initial operation and refined during operation allows accurate prediction of all properties and operating variables. This has been demonstrated very effectively at Savannah River and at the West Valley Demonstration Project.

7) Process Robustness/Reliability.

Cement stabilization was shown to have a narrow window for acceptability without significant sacrifice in waste loading, as demonstrated by the failure of 11 of 12 formulations tested. These failures were both in leaching and compression strength. These factors are critical to process implementation, and these failures have been understated in evaluation of the process robustness, implementability, rework quantities, long-term protection, process control, and numerous other areas throughout the Feasibility Study.

Product Rework was taken to be 1% of the product produced for all four technologies. This is not a valid assumption based on the actual 1/12 acceptable formulations of the Cement-Stabilization POPT demonstration. This low level of rework was not demonstrated, and it is doubtful that it can be achieved.

The results of the Chemical Stabilization – Cement tests (page G 3-16, Line 20-25) show an increase in the cement content from 8.42 wt% to 12.11 wt.% increased the TCLP leaching from 0.0144 ppm to 301 ppm lead. Based on this, the Stabilization-Cement process should not be deemed capable, considering expected variation in the waste, the water content, the analytical methods, and in the weighing of material additions.

The robustness of the VIT1 process, even at 90% waste loading, was demonstrated by the number and breadth of glass formulations that were developed and still met the TCLP requirements. Significant variations in waste, or in process variation, could be accepted by the VIT process without significantly affecting product performance.

8) Process Control:

Process control for vitrification is based on qualification of the waste prior to melting, and verification of performance. These activities are in-process hold points, or near-process feedback points. Off-spec product is unlikely, and can be corrected quickly. None was produced during the extended POPT demonstration of VIT1.

With the grout, determination of defective product cannot be made for a minimum of a week due to curing. Detection of process deviation or performance problems cannot be detected until the wasteform is fully cured, during which time numerous batches have been processed. This raises the question of whether the chemical stabilization process can operate within the very small-required working region, both in terms of chemical durability and processability.

Several other problems were identified with the Chemical Stabilization processes in Section G.3. This was particularly prevalent with the cement-based stabilization, including flow characteristics, curing/hardening time and unbound water in the product. All of these indicate poor process control, giving unacceptable product. Based on the POPT data presented, the stabilization-cement technology did not demonstrate process capability and should be significantly down-rated.

Further difficulties were experienced with the chemical stabilization technologies (particularly cement) with meeting the TCLP leaching requirements. The FS suggested that the mix could be 'tuned' to match the TCLP No. 2 leachant, i.e. so the pH of the TCLP tests will approach the minimum solubility of lead. This approach is a severe circumvention of the intent of the TCLP testing process. These conditions are not likely in the NTS disposal cell and the waste may be exposed to lower or higher pH conditions that result in rapid degradation and/or leaching of the wasteform. Such “tuning” does not serve the long-term protection of the environment.

9) Transportation-Shielding Optimization.

The VIT1 evaluation should be reassessed to include an optimized container and associated changes such as fritting as favored by the optimization. The VIT 1 design approach submitted by Envitco relied on a qualified container design by SEG as described in the POPT report. <u>This container design was utilized at the suggestion of FDF,</u> and Envitco understood that all technology providers would utilize this container.

However, as reported in the Feasibility Study, the shipping and disposal containers for the other three technologies were specified following a container optimization exercise by FDF. The container design for VIT1 was not optimized, and provided approximately 155% the shielding that is required. The difference is significant in terms of waste per container, number of containers required, and ultimately a significantly increased number of shipments. This approach unfairly skews the transport costs, since the volume transported is 270% of the actual glass volume (i.e. packaging ~170% of vitrified waste volume, 153% of the vitrified waste mass).

The SEG container used by VIT1 was a qualified container meeting drop test requirements while the containers selected after optimization for the remaining three technologies were unqualified. If unqualified packaging is acceptable at this phase of the study, then FDF should re-assess the packaging for the VIT 1 wasteform. This would include optimization of the wall thickness to meet the 70 mrem/hr requirement, and re-assessing the transport volume, costs and risks. It is not equitable to assess one technology based on an unoptimized, yet qualified container, while the other technologies utilize unqualified, though dimensionally optimized containers.

10) Cost:

The cost data appearing in the FS for VIT1 was significantly different than that presented in the Public Workshop in November 1999. VIT 1 costs increased by over 25%, primarily due to cost of money and O&M costs. This magnitude of change did not appear in the cost assessments for the other technologies. It was not obvious to us why this would differ for the different technologies.

VIT1 should be evaluated on the basis of at least 85-90% on-line time. The vitrification technologies were penalized for 24 hr/day, 7 day/week schedules, although this is not critical to the operation of either technology. This has, however, been identified as an increased risk, increased cost, inability to recover schedule, inability to accelerate schedule, and various other negatives in the assessment. The vitrification technologies focused on 70% utilization, a utilization rate that is significantly lower than commercial glassmaking processes. It would be more accurate to consider the higher demonstrated utilization of the vitrification processes based on commercial history.

VIT1 should be evaluated on the basis of supplying an initial 30 ton/day melter. The size of the Joule-heated melter presented in the conceptual design was based on requirements set in the contract by FDF, which called for a three-year treatment schedule, and a 70% maximum utilization. An advantage was awarded to Chemical Stabilization due to their ability to add capacity. This award does not seem justifiable. The VIT1 evaluation should be adjusted to include construction of a larger melter. There is no constraint on the size of the melter —the VIT 1 team has built commercial Joule-heated melters as large as 250 TPD. Construction of a 30 TPD melter to allow accelerated cleanup or allows for “catch up” can be done without a proportional increase in cost. There is no justification in requiring a second melter when assessing the need for additional capacity. A second melter is not required for additional capacity. A single 30 TPD melter could be designed and constructed at the start of operations and provide the same flexibility, reduced operating manpower, and accelerated treatment flexibility as has been deemed an advantage for the Chemical Stabilization technologies.

We appreciate your consideration of our concerns.

Dr. Douglas H. Davis
Sr. Glass Technologies
Toledo Engineering Co., Inc.

Douglas H. Davis

Mr. David Bennert
President
Innovatech Services, Inc.

Geosafe Corporation
Advanced Vitrification Solutions International

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May 16, 2000

Mr. Gary Stegner
US DEPARTMENT OF ENERGY
Fernald Area Office
P.O. Box 398705
Cincinnati, OH 45239-8705

Mr. James A. Saric
US EPA, 5HRE 8J
77 W. Jackson Blvd.
Chicago, IL 60604

GEOSAFE CORPORATION COMMENT ON THE REVISED PROPOSED PLAN FOR REMEDIAL ACTIONS AT SILOS 1 AND 2

Dear Messrs. Stegner and Saric:

Geosafe Corporation herein submits its comments on the Revised Proposed Plan for Remedial Actions at Silos 1 and 2, in response to DOE's call for public comments. Our comments are based on a detailed review of the Revised Feasibility Study Report for Silos 1 and 2, our close monitoring of the Silos 1 and 2 project over the past three years, and significant familiarity with the technologies involved in the project.

Our primary comment is that the ROD should NOT be changed to identify chemical stabilization as the preferred treatment remedy in lieu of vitrification. This comment is based on the fact that the Revised Feasibility Study is flawed and gives erroneous results, for the following reasons:

1) It fails to recognize the superiority of vitrified waste over chemically stabilized waste relative to the most important threshold criteria of overall protection of human health and the environment. To conclude that both vitrification and chemical stabilization technologies are equivalent relative to the threshold criteria is technically indefensible. The TCLP test employed for this comparison is artificially biased toward chemical stabilization due to the high pH of the wasteform and the resulting leachate, and the dilution of contaminants that resulted from the 5-fold bulking up of the wasteform. The evaluation also fails to recognize the significant differences in life expectancy between the wasteforms, and the impact of life expectancy on long-term protection of human health and the environment.

2) It establishes preference for chemical stabilization based on evaluation against the five primary balancing criteria. This is not appropriate in that the specific vitrification technologies evaluated are not representative of vitrification technologies that have been specifically developed for treating earthen waste materials such as are in Silos 1 and 2. Thus the cost, implementability, short-term effectiveness, and related performance factors developed are not representative of this technology class, and the balancing criteria evaluation is inadequate.

Given these flaws, the Revised Proposed Plan appears to be an attempt to select a lesser remedy as an expedient to resolve the prior failure of the Silo 1 and 2 vitrification program. Geosafe recognizes the difficulties posed by that failure, but comments that the Revised Proposed Plan is not an acceptable way to resolve the problem. Geosafe suggests that the vitrification aspect of the current ROD is acceptable as it stands. The errors of the prior vitrification program lie in the specific technology, equipment and management that was employed, and should not be used to condemn the whole class of vitrification technologies and to justify a less effective remedy.

Geosafe recognizes the political need for DOE and EPA to identify an alternative to vitrification due to the past failure of the vitrification program at Fernald. As noted above, it would be an even greater failure if vitrification is excluded from future consideration. If DOE must identify an alternative, then Geosafe suggests that chemical stabilization be included in the revised ROD as a lesser contingent remedy; but it certainly should not replace the vitrification alternative as the primary remedy. Such replacement would be an injustice relative to the environment, and would result in an unfair restriction of commercial competition. We are aware that the use of contingent remedies within a ROD are an acceptable CERCLA practice.

Geosafe also believes that inadequate consideration has been given to the possibility of offsite treatment of the waste by commercial vendors. We believe that such offsite treatment capability either presently exists, or will shortly. In any case, such offsite capability can be established at far less cost than is projected for a temporary facility at Fernald which will be destroyed at the end of the project. Establishment of commercial facilities would also benefit the Government and the public through their availability for continued use, and their lower overall cost to this project. The Revised Feasibility Study produced estimates of total project costs exceeding $20,000 per ton of waste treated. That is an exorbitant cost for a waste that can be treated by vitrification for direct vendor costs of less than $1000 per ton. Geosafe very strongly suggests that the ROD additionally revised to allow offsite treatment by commercial vendors as an acceptable alternative.

DOE should define a performance specification consistent with the capabilities of best available technology, and then should procure remediation of the Silos 1 and 2 waste on an open competition basis. As a vendor of vitrification services, Geosafe would be pleased to compete in a procurement for remediation of Silos 1 and 2 waste, at either an onsite or offsite facility. The GeoMelt technology has been demonstrated to be effective on this type of waste and it does not require the same constraints that led to the failures of the prior vitrification program. It can also be applied more cost effectively.

Geosafe's comments relative to specific errors and omissions in the Revised Proposed Plan are attached. Please contact me if I can provide clarification of these comments.

Sincerely,

GEOSAFE CORPORATION

James E. (Jim) Hansen, President

DETAILED COMMENTS BY GEOSAFE CORPORATION ON THE REVISED PROPOSED PLAN FOR REMEDIAL ACTIONS AT SILOS 1 AND 2

Page 2-16. line 14 - The basis for development of alternatives is said to have included, "commercial and DOE-complex experience...". It is obvious from the Revised Feasibility Study and the Revised Proposed Plan that this statement is not true relative to vitrification technologies. Geosafe has provided information on its GeoMelt vitrification technology to DOE and Fluor Daniel Fernald (FDF) several times; and it is apparent that this technology has been ignored by the studies. This technology has been used commercially on hazardous and radioactive waste more than any other vitrification technology.

Page 6- 1, line 10 - The two vitrification technologies selected for Proof-of-Principle (POP) testing are judged to be "representative" of the class of vitrification technologies. The two technologies tested are certainly not representative of available vitrification technologies. There are vitrification technologies better suited for treatment of earthen materials such as the Silos 1 and 2 waste. One such superior technology is the GeoMelt vitrification technology.

Page 7- 1, lines 21-23 - The Proposed Plan states here and several other places that "equivalent processes" may exist and "are not precluded from consideration...". In fact equivalent and even superior systems are being excluded from further consideration by not having been appropriately considered in the Revised Feasibility Study or the Revised Proposed Plan.

Page 7-3. lines 14-15 - The statement that "both vitrification and chemical stabilization provide overall protection of human health and the environment" is very misleading. In fact they may both meet or exceed a minimum threshold value relative to leaching resistance, for instance; however, there are major differences in the level of performance relative to this criterion. Additional comments below relate to this position.

Page 7-5. lines 4-7 - The erroneous implication in these statements is that both technology classes are equivalent relative to leaching resistance, even when the "original wasteform is degraded". It is well known by DOE and EPA that vitrified waste has superior long-term leaching resistance to chemically stabilized waste. It is also known by these parties that the TCLP test produces positively biased results for chemically stabilized waste in that the presence of alkali materials in the waste buffers the acid used in the TCLP testing. This is evidenced by the TCLP results for the POP-tested technologies. The leachate from the chemical stabilization wasteform testing was highly basic, whereas it started out acidic. It is known that once the alkali is "spent", the leaching resistance of chemically stabilized waste falls off dramatically when exposed to acidic conditions.

The TCLP results are also biased due to dilution of contaminants that occurs due to the bulking (volume increase) of the chemical stabilization wasteform. A volume increase of nearly 500% has been used to dilute these wastes; and then the diluted waste's TCLP performance is compared to that of the vitrified wasteforms which did not dilute, but rather concentrated the waste. For this reason it is not appropriate to say the four wasteforms were equivalent on the TCLP basis.

It is also known that the estimated life expectancy of chemically stabilized product falls in the range of 10 to 100 years; whereas vitrified waste has a life expectancy of thousands to millions of years. It is certainly misleading to state that the two technology classes are equivalent in terms of leaching resistance over the long term.

Page 7-7. lines 6-7 - The statement that chemical stabilization ensures "long-term protectiveness of human health and the environment..." is very misleading. It is only a matter of time and the chemically stabilized waste will fail and become a risk to human health and the environment. The comments in the item above apply here also.

Page 7-10. lines 27-28 - The statement regarding generation of waste streams may be true for the vitrification technologies that were POP tested; however, this is not true for all vitrification technologies. For instance, the GeoMelt vitrification technology consumes its own secondary waste, by recycling back to subsequent melts, and substantially reduces the total amount of waste generated compared to the alternative technologies.

Page 7-11. lines 26-27. continuing on Page 7-13. lines 1-2 - The statements relative to radon release are true; however, they omit recognition that the overall amount of radon released from the vitrified wasteform throughout its lifetime will be far less than that released by the chemically stabilized wasteform. Vitrification results in essentially stopping the release of radon to the environment. Chemical stabilization temporarily slows the release; and at some time in the future, when the product is degraded, radon emanation and release to the environment will return to high levels. This is another benefit of vitrification that relates to long-term protection of human health and the environment.

Page 7-11. lines 18-15. and Table 7.2-1 - The text cites an "occupational hazard analysis" which "evaluated the potential physical and chemical hazards to the workers...". The logic used resulted in vitrification being rated lower than chemical stabilization. The analysis missed the point that due to greater intrinsic hazard (i.e., high temperature and high voltage), the vitrification industry has taken steps to ensure worker safety. A more appropriate comparison would have been to compare the actual safety records of the two technology classes on a manhours worked basis. In the 20+ years that the GeoMelt technology has been under development and in commercial use, there has not been a single worker lost time injury associated with the technology. The analysis used in this evaluation was inappropriate relative to what really counts ... actual personnel safety.

Page 7-14, lines 1 through 14 and Table 7.2 -3 - The analysis and conclusions presented here are an example of error resulting from the assumption that the POP-tested vitrification technologies are representative of the class. "The time period between the approval of the ROD amendment and the initiation of treatment operations..." specified for vitrification technologies is far longer than would be required for the GeoMelt technology. In addition, the 8-month requirement for performance of "Proof of Process" testing for vitrification is unnecessary for technologies such as the GeoMelt vitrification technology. More than 25,000 tons of waste and debris have been commercially processed by the GeoMelt technology. This amount is far more than the combined total of all the other vitrification technologies under consideration by DOE. It would not be necessary to perform such testing on the GeoMelt technology. This technology has been demonstrated several times before on behalf of DOE. For example, a 300-ton demonstration melt, performed on mixed waste-contaminated soil and debris, was performed for DOE at LANL in April, 2000. The technology has also been demonstrated capable of treating simulated Silos 1 and 2 waste without difficulty.

Page 7-16 lines 1-2 and Table 7.2-4 - The comparison of operating times is misleading due to differences in scale between the technologies being compared. The vitrification alternative can be made to operate at higher rates if desired. See further comments regarding scale below.

Page 7-16. lines 1 -11 and Figure 7.2-5 - The implementability evaluation may be correct for the POP-tested vitrification technologies, but unfairly judges others, like the GeoMelt technology. As noted above, the GeoMelt technology has excellent commercial experience and has no uncertainty relative to successful implementation. The analysis is clearly biased toward chemical stabilization, particularly in the areas of commercial demonstration, ease of acceleration, and constructability.

Page 7-19. lines 2-14 - The section on scaleup fails to recognize vitrification technologies beyond those that were POP-tested GeoMelt vitrification, which involves joule heating, but does not use a refractory-lined melter vessel such as the POP-tested technologies, has been demonstrated and used commercially many times before on radioactive and hazardous materials at rates far exceeding the 15-tpd scaleup size evaluated in the Revised Proposed Plan. GeoMelt capacity to 150 tpd exists, and many thousands of tons of materials have been treated in the range of 30 to 80 tpd. On an 80 tpd basis, the hours required for GeoMelting would be less than half those required for the Chem 1 alternative (reference Table 7.2-4). Scaleup risk is not a concern for the GeoMelt technology. This scale of equipment can be provided at lower capital cost than that of the POP-tested alternatives. Similarly, there is no need to scaleup the off-gas treatment technology that would be employed with the GeoMelt technology.

Page 7-19, lines 20-25 - The Plan states that joule-heated vitrification has not been used on material "reasonably similar to Silos 1 and 2 material at the scale being proposed by the POP contractors ". As noted above, that is an erroneous statement. The GeoMelt technology has been used to treat actual simulated Silos 1 and 2 material (unpublished data provided to Fluor Daniel Fernald and DOE in 1997); and that material behaved during processing in a manner very similar to the great majority of the >25,000 tons of earthen materials processed to date.

Page 7-20, lines 15-21 - The statements made are true for the vitrification technology cited; however, they are misleading relative to vitrification as a class. The GeoMelt vitrification technology, including its off-gas treatment system and other equipment, has been judged by EPA and DOE as highly reliable (reference EPA/540/R-94/520). The comparison regarding reliability is misleading.

Page 7-20, lines 22-28 - Vitrification can easily equal chemical stabilization relative to schedule acceleration/recovery by simply employing a larger scale of equipment. It is apparent that the two technologies being compared are "apples and oranges" relative to processing scale (refer to discussion above for page 7-19, lines 2-14).

Page 7-2 1, lines 1-2 - Not all vitrification technologies require the installation of custom refractory. The GeoMelt technology would rate more favorably relative to constructability.

Page 7-23. Table 7.2-2 - The vitrification cost estimates are not representative of all vitrification technologies. The GeoMelt technology could be applied at significantly lower cost than all the technologies evaluated.

The summary cost data points out in a glaring way the need to consider offsite treatment as opposed to onsite treatment of the waste. The logic of building a $55-69 million facility for three years of use, and then to spend $24-25 million to decommission (destroy) it should be subject to serious evaluation. These are costs that would be better spent on behalf of the Government, public and industry if they were instead invested in commercial waste treatment capacity. In addition, commercial offsite treatment would greatly reduce or nearly eliminate other costs associated with project management and the cost of money.

Page 7-25, lines 7-20 - The capital and operating costs cited for vitrification are again not representative. GeoMelt vitrification capital costs are typically less than half of melter-based technologies. As noted earlier, neither an 8 month testing period of expensive spare parts nor refractory replacement are necessary for GeoMelt vitrification.

Page 8-1, lines 21-27 - The comparative evaluation against the five primary balancing criteria is not appropriate because the vitrification technologies evaluated are not representative. The evaluation does not appear to give adequate importance to the superior environmental properties and life expectancy of the vitrified product compared to the chemically stabilized product.

Page 8-5, lines 17-28 - These summary statements regarding vitrification are in error as indicated in the comments above.

Page 8-7, -lines 7-8 - It should be noted that the GeoMelt vitrification technology is capable of processing soils and debris related to the OU-4 remediation project. The use of this process at the site for the Silos 1 and 2 waste could have subsequent benefit to DOE for completion d the OU-4 cleanup.

Page 8-10, line 4 - Whereas the remedy may be permanent as far as the Fernald facility is concerned, the chemical stabilization alternative is certainly not a permanent solution for the waste itself. The problem will have been moved to another location and the public will once again have the opportunity to spend further resources on its ultimate treatment at a future time. It is inappropriate to call the Proposed Plan a permanent remedy.

GeoMelt Vitrification Advantages Relative to Melter-Based Vitrification

3. Simpler technology
   - No melter vessel
   - No waste pretreatment requirement
   - No additive requirement
   - No feeding equipment
   - No withdrawal equipment

4. Lower cost
   - Capital
     - less expensive construction
   - Operating
     - larger scale
     - longer equipment life expectancy
     - lower personnel requirement
     - no need to purchase additives
     - less material to treat due to absence of additives
     - less product to ship due to absence of additives and higher volume reduction
     - less product to landfill due to lesser volume

5. More robust technology
   - Larger scale
   - Higher melting temperature
   - Unconstrained by melt temperature
   - Tolerance of heterogeneity, waste and debris

6. Superior vitrified product
   - Higher metals retention in melt
   - Greater leaching resistance

7. Greater experience
   - More than 25,000 tons processed
   - EPA SITE Program demonstrated
   - EPA permitted for treatment of PCBs
   - DOE demonstrated several times
   - Seven scales of equipment to 150 tpd
   - Prior treatment of surrogate Silos 1 and 2 waste
   - Experience treating far more hazardous/radioactive waste than Silos 1 and 2 waste

ATTACHMENT B.IV
NOTICES OF PUBLIC COMMENT PERIOD AND HEARINGS PLACED IN MAJOR LOCAL NEWSPAPERS

March 29, 2000
Harrison Press
Page 4A
“Notice of Availability and Notification of Public Meeting”

NOTICE OF AVAILABILITY AND NOTIFICATION OF PUBLIC MEETING

FEASIBILITY STUDY/PROPOSED PLAN FOR REMEDIAL ACTIONS AT SILOS 1 AND 2
Fernald Environmental Management Project

The United State Department if Energy (DOE) announces the availability of a Proposed Plan for remediation of Silos 1 and 2, a component of Operable Unit 4 at the Fernald Environmental Project. The Proposed Plan identifies a preferred alternative as well as the other alternatives considered, for public comment.

The December 1994 Record of Decision tor Remedial Actions at Operable Unit 4 identified removal of the material and treatment by vitrification followed by off-site disposal at the Nevada Test site as the remedy for Silos 1 and 2. In the Revised Feasibility Study for Silos 1 and 2, DOE reevaluated vitrification and other potential technologies for treatment of the Silos 1 and 2 material. A detailed evaluation of vitrification and chemical stabilization was conducted.

Based upon available information, the preferred alternative proposed for the public comment is removal, treatment of the Silos 1 and 2 material by chemical stabilization, and off-site disposal at the NTS. Although this is the Preferred Alternative at the present time, DOE welcome as the comments from the public on both alternatives. The formal public comment period begins on April 3 and ends on May 18, 2000. DOE will select the final remedy, with the concurrence of the United States Environmental Protection Agency and the Ohio Environmental Protection Agency, after the end of the public comment.

DOE will hold a public meeting to discuss the Proposed Plan and accept oral or written public comments an April 25, 2000. from 6:30-8:30p.m., at this Alpha Building, Classroom D, 10967 Hamilton-Cleves Highway, Harrison, Ohio.

Copies of the Feasibility Study/Proposed Plan for Silos 1 and 2, and other supporting information are available at:

Public Environmental Information Center
10995 Hamilton-Cleves Highway
Harrison, Ohio. 45030
(513) 648-7480

For further information or to submit written comments, please contact:

Mr. Gary Stegner
U.S. Dept of Energy
Fernald Environmental Management Project
PO. Box 538705
Cincinnati, Ohio 45253-8705
(513) 648-3153

NOTICE OF AVAILABILITY AND NOTIFICATION OF PUBLIC MEETING

FEASIBILITY STUDY/PROPOSED PLAN FOR REMEDIAL ACTIONS AT SILOS 1 AND 2

Fernald Environmental Management Project

The United States Department of Energy (DOE) announces the availability of a Proposed Plan for remediation of Silos 1 and 2 a component of Operable Unit 4, at the Fernald Environmental Management Project. The Proposed Plan identifies a preferred alternative, as well as the other alternatives considered, for public comment.

The December 1994 Record of Decision for Remedial Actions at Operable Unit 4 Identified removal of the material and treatment by vitrification followed by off-site disposal at the Nevada Test Site as the remedy for Silos 1 and 2. In the Revised Feasibility Study for Silos 1 and 2, DOE reevaluated vitrification and other potential technologies for treatment of the Silos 1 and 2 material. A detailed evaluation of vitrification and chemical stabilization was conducted.

Based upon available information, the preferred alternative proposed for public comment is removal, treatment of the Silos 1 and 2 material by chemical stabilization, and off-site disposal at the NTS. Although this is the Preferred Alternative at the present time, DOE welcomes the comments from the public on both alternatives. The formal public comment period begins on April 3 and ends on May 18, 2000. DOE will select the final remedy, with the concurrence of the United States Environmental Protection Agency and the Ohio Environmental Protection Agency, after the end of the public comment period.

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Copies of the Feasibility Study/Proposed Plan for Silos 1 and 2, and other supporting information are available at

Public Environmental Information Center
10995 Hamilton-Cleves Highway
Harrison, OH 45030
Phone: (513) 648-7480

For further Information or to submit written comments, please contact:

Mr. Gary Stegner
U.S. Department of Energy
Fernald Environmental Management Project
P.O. Box 538705
Cincinnati, Ohio 45253-8705
Phone (513) 648-3153

NOTICE OF AVAILABILITY AND NOTIFICATION OF PUBLIC MEETING

REVISED PROPOSED PLAN FOR REMEDIAL ACTIONS AT SILOS 1 AND 2

Fernald Environmental Management Project

The United States Department of Energy (DOE) announces the availability of a revised Proposed Plan for remediation of Silos 1 and 2, a component of Operable Unit 4, at the Fernald Environmental Management Project. The Proposed Plan identifies a preferred alternative, as well as the other alternatives considered, for public comment.

Based upon available information, the preferred alternative proposed for public comment is removal, treatment of the Silos 1 and 2 material by chemical stabilization, and off-site disposal at the NTS. Although this is the Preferred Alternative at the present time, DOE welcomes the comments from the public on other alternatives. The formal public comment period begins on April 3 and ends on May 18, 2000. DOE will select the final remedy, with the concurrence of the United State Environmental Protection Agency and the Ohio Environmental Protection Agency, after the end of the public comment period. Either alternative may be selected after consideration of public comments.

DOE will hold a public meeting to discuss the Proposed Plan and accept oral or written public comments on April 25, 2000, from 6:30-8:30p.m., at the Alpha Building, Classroom D,10967 Hamilton-Cleves Highway, Harrison, Ohio.

Copies of the Proposed Plan, the Revised Feasibility Study for Silos 1 and 2, and other supporting information are available at:

Public Environment Information Center
10995 Hamilton-Cleves Highway
Harrison, OH 45030
Phone: (513) 648-7480

For further information or to submit written comments, please contact:

Mr. Gary Stegner
U.S. Department of Energy
Fernald Environmental Management Project
P.O. Box 538705
Cincinnati, Ohio. 45253-8705
Phone: (513) 648-3153

[illegible] in a newspaper of general [illegible] within Nye County, Nevada, [illegible] of May, 2000.
Sandra "Sandi" L. Merlino
Nye County Clerk and Ex-Officio [illegible] of the Board
PUBLISH: March 24 and April 7, 2000.

NOTICE OF TRUSTEE'S SALE
[illegible]
[illegible] 21, 2000 at 11:00 a.m. [illegible] State of Nevada, as [illegible] to Deed of Trust dated [illegible] 1999 executed by [illegible] as Trustor, in favor of [illegible] Lee DelFrate and [illegible] Anne DelFrate, Trustees of the DelFrate [illegible] Trust, as beneficiary, and recorded August [illegible], 1999, as Document No. 475562 and rerecorded on August 24, 1999 as [illegible] of Nye County, [illegible] and [illegible] a [illegible] \$42,000.00, [illegible] under such Deed of Trust and the obligations secured thereby [illegible] by Mary Lee DelFrate and [illegible] Anne DelFrate, Trustees of the DelFrate 1997 Trust [illegible] of the obligation [illegible] in default, [illegible] recorded [illegible] County Recorder of Nye County, Nevada, the [illegible] for cash [illegible] the highest bidder [illegible] Street [illegible] Parkway, [illegible] Nevada [illegible] all right, title and interest [illegible] by it under said Deed of Trust in the property situated in the County of Nye, State of Nevada, described as follows:
[illegible]
[illegible] Document No. 1435 in Book [illegible], Page 400, of Official Records, Nye County, Nevada. EXCEPTING THEREFROM [illegible]
[illegible]
[illegible] without covenant or warranty, express or implied, regarding title, possession or encumbrances to pay the unpaid balance of said note, as well \$52,000.00, with interest thereon from October 20, 1999, as in said note provided, advances, if any, and costs of the trustee under the terms of said Deed of Trust will be [illegible]
DATED: March 28, 2000
STEWART TITLE OF NEVADA
A Nevada Corporation, as Trustee
Mary Regan Hunt
Assistant Vice President
Foreclosure Officer
PUBLISH: March 31, April 7, 14, 2000.

NOTICE OF AVAILABILITY AND NOTIFICATION OF PUBLIC MEETING FEASIBILITY STUDY/ PROPOSED PLAN FOR REMEDIAL ACTIONS AT SITES 1 AND 2

Nevada Environmental Management Project

The United States Department of Energy (DOE) announces the availability of a Proposed Plan for remediation of Sites 1 and 2, a component of Operable Unit [illegible] the Nevada Environmental Management Project. The Proposed Plan identifies a preferred alternative, as well as other alternatives considered, for public comment.

The December 1994 Record of Decision for Remedial Actions at Operable Unit [illegible] called for [illegible] of the material [illegible] for off-site disposal at the Nevada Test Site [illegible] Sites 1 and 2. [illegible] Feasibility Study on Sites 1 and 2 [illegible] for treatment of the Sites 1 and 2 material. A detailed evaluation of [illegible] was conducted. Based upon available information, the preferred alternative proposed for public comment is removal [illegible] of the Sites 1 and 2 [illegible] at the NTS. Although this is the Preferred Alternative, [illegible] welcomes the comments from the public on [illegible] alternatives. The formal public comment period begins on April 3 and ends May 18, 2000. DOE will select the final remedy after the consideration of the United States Environmental Protection Agency and the Ohio Environmental Protection Agency, [illegible] of the public comment period.

DOE will hold a public meeting to discuss the Proposed Plan and accept oral and written public comments on May 3, 2000, from 6:30 [illegible] p.m., in the South Conference Room of the Department of Energy's Nevada Support Facility, 232 Energy Way (just off [illegible] Rd.) in North Las Vegas. Written public comments [illegible] throughout the [illegible] of the public comment period.

Copies of the Feasibility Study/ Proposed Plan for Sites 1 and 2 and other supporting information are available at these locations:

Public Environmental Information Center
10995 Hamilton-Cleves Highway
Harrison, OH 45030
Phone: (513) 648-7480

DOE Public Reading Room
2621 Losee Rd., Bldg. B-3
Las Vegas, NV 89030
Phone: (702) 295-1628

For further information or to submit written comments, please contact:
Mr. Gary Stegner,
Public Affairs Officer
U.S. Department of Energy
Nevada Environmental Management Project
P.O. Box 538705
Cincinnati, OH 45253-8705
Phone: (513) 648-3153
PUBLISH: March 31, 2000

REAL ESTAT[illegible]

NOTICE OF AVAILABILITY AND NOTIFICATION OF PUBLIC MEETING

FEASIBILITY STUDY/PROPOSED PLAN
FOR
REMEDIAL ACTIONS AT SILOS 1 AND 2
Fernald Environmental Management Project

The United States Department of Energy (DOE) announces the availability of a Proposed Plan for remediation of Silos 1 and 2, a component of Operable Unit 4, at the Fernald Environmental Management Project. The Proposed Plan identifies a preferred alternative as well as the other alternatives considered, for public comment.

The December 1994 Record of Decision for Remedial Actions at Operable Unit 4 identified removal of the material and treatment by vitrification followed by off-site disposal at the Nevada Test Site as the remedy for Silos 1 and 2. In the Revised Feasibility Study for Silos 1 and 2, DOE reevaluated vitrification and other potential technologies for treatment of the Silos 1 and 2 material. A detailed evaluation of vitrification and chemical stabilization was conducted.

Based upon available information, the preferred alternative proposed for public comment is removal, treatment of Silos 1 and 2 material by chemical stabilization, and off-site disposal at the NTS. Although this is the Preferred Alternative at the present time, DOE welcomes comments from the public on both alternatives. The formal public comment period begins on April 3 and ends on May 18, 2000. DOE will select the final remedy, with the concurrence of the United States Environmental Protection Agency and the Ohio Environmental Protection Agency, after the end of the public comment period.

DOE will hold a public meeting to discuss the Proposed Plan and accept oral or written public comments on May 3, 2000, from 4:30-6:00 p.m., in the Sedan Conference Room at the Department of Energy's Nevada Support Facility, 232 Energy Way (just off Losee Rd.), in North Las Vegas. Written public comments can be submitted throughout the entirety of the public comment period.

Copies of the Feasibility Study/Proposed Plan for Silos 1 and 2, and other supporting information are available at these locations:

Public Environmental Information Center	DOE Public Reading Room
10995 Hamilton-Cleves Highway	2621 Losee Rd., Bldg. B-3
Harrison, OH 45030	Las Vegas, NV 89030
Phone: (513) 648-7480	Phone: (702) 295-1628

For further information or to submit written comments, please contact:

Mr. Gary Stegner, Public Affairs Officer
U.S. Department of Energy
Fernald Environmental Management Project
P.O. Box 538705
Cincinnati, Ohio 45253-8705
Phone: (513) 648 -3153